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ARCHIVES OF OTOLARYNGOLOGY

VOLUME 6 AUGUST, 1927 NUMBER 2

UTILIZATION OF SKIN OF THE UPPER EYELID FOR THE REPAIR OF SMALL FACIAL DEFECTS

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NEW YORK

While the availability of grafts of free skin of full thickness from the eyelid for repairs about the orbital region is generally recognized, it is possible that their suitability for certain repairs and corrections beyond that area is not so well known. The fact that in a series of forty-eight such operations forty-six were immediately successful suggests the desirability of inviting attention to the advantages of the method.

The prime recommendation of the graft from the eyelid, as compared with other grafts of full thickness, is the assurance that it will "take," a merit it possesses in exceptional degree. A second advantage is that the skin of the lid, if normal in color, matches the skin of the face better than that brought from a distance. Third, the reorganization after healing is so complete that after a few weeks the borders of approximation actually cannot be identified, either at the place of repair or on the lid from which the graft has been taken.

These advantages are obvious when there is question of ectropion of the upper or the lower lip; a distortion at the angle of the mouth; loss of skin on the nasal ala, the columella or the cover of the nose; small burns, whether from acid, lye, radium or fire; "port wine stain," hairy moles or small depressed scars, or lagophthalmos caused by some cicatricial contraction.

The single important contraindication is the relatively excessive pigmentation sometimes observed in the skin of the eyelid. This condition is not so frequently found in persons with fair skin as in those of the brunette type.

The extent of individual replacements in practice is greater than at first thought might be supposed. The sound upper lid can part with a large proportion of its covering of skin without injury, nearly half the width (in fusiform excision) by three fourths of the length. Healing of the approximated edges of skin leaves no visible scar, thus conforming to the first principle of constructive reparative surgery, namely, that

no new disfigurement shall be made if avoidance is possible. When both lids can be drawn on, and the grafts placed side by side, the area that can be covered is doubled, and defects can be dealt with that otherwise would call for procedures of considerable magnitude. Instances are numerous in which this recourse is particularly useful.

When the graft from the eyelid is used, the form of the pattern around which the incisions are made is important. Since the perfect closing of the wound in the lid is a prime consideration, the removal of a semi-elliptical section leaves edges that approximate naturally and with

Fig. 1.—Scar condition at the corner of the mouth.

Fig. 2.—Graft from the eyelid in place.

the minimum of tension. A further refinement of procedure consists in carrying the defining incisions past each other at both ends of the graft; this facilitates closure without the puckering that might otherwise produce a slight disfigurement. In the preparation of the defect, the surgeon should allow for this factor. As soon as the incisions are made, threads should be inserted at the ends of the graft and at opposite points on the sides. When freed, the graft is lifted and transferred by these threads; never by metal forceps. Moreover, the threads serve to anchor the graft in position at once, after which the rest of the suturing can be accurately and swiftly effected.

The separation of the graft is best made by working from the middle outward toward each end, using curved scissors, or the scalpel if preferred. The essential at this stage is to respect the strands of muscle below the skin; the state of the underlying structures necessarily influences the healing of the edges of the skin after approximation. The continuous movement of the lid contributes to whatever stretching or

Fig. 3.—Loss at the nasal ala.

Fig. 4.—Graft from the eyelid in place.

other adjustment of the skin is involved in restoration of the normal appearance.

The effectiveness of these grafts from the eyelid, as compared with other grafts of full thickness (Wolfe), may be attributed to the nature of the skin itself. It is the thinnest on the body, is soft and pliable, and the restoration is not encumbered by the presence of dense fibers of connective tissue such as are found with the ordinary skin.

Doubtless for the same reason, the pressure to be applied is less than is required for the ordinary Wolfe graft, about 20 mm. of mercury instead of 30 mm., and the pressure is necessary for only three days, as compared with eight or ten days in the other case.

A further peculiarity of texture in the skin of the eyelid is indicated by the appearance when the pressure bandage is removed. A state of health is indicated with the Wolfe graft by coloration characteristic of

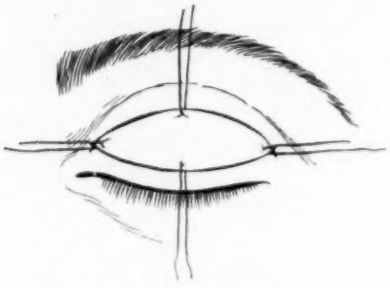

Fig. 5.—Technic of removing an upper eyelid graft; crossing of incisions at the angles should be noted, also sutures to lift and anchor graft.

Fig. 6.—Examples of defects susceptible of cover by graft from eyelid; both lids may be drawn on for the larger defects.

contused skin, whereas the graft from the eyelid has that tint of pink which in France is called "rose-rose." Failure with the Wolfe graft is indicated by a dirty gray, shading to dead white; with the skin from the eyelid there is a tone of pearl, or faint purple, associated with the gray.

The peculiar tint of the restored graft from the eyelid may persist for a considerable time. The basic red gives way gradually to brown; then one notices, working from the edges of the graft inward, a resumption of the natural color. The double process may last a month, or it

may not be completed for three or four months; but if the skin was of the right color at first, eventual return to the normal can be expected with every assurance.

The pressure bandages and dressings and some of the sutures are removed on the third day; the rest, on the fourth day. The bandages are not reapplied, treatment reverting to that of the open wound.

The total period of hospitalization is from five to eight days.

SUMMARY OF ADVANTAGES

Advantages of using a graft of skin from the eyelid are: that a disfiguring scar does not result from obtaining the graft; that facility in handling, assurance of "take," and rapidity of restoration make relatively eary an otherwise difficult procedure; that the restored graft is indistinguishable from the surrounding skin; that the minimum scar at the edges of the wound is often impossible to identify, and that the stay in the hospital is reduced to a minimum.

EFFECT OF CAMPHOR, EUCALYPTOL AND MENTHOL ON THE VASCULAR STATE OF THE MUCOUS MEMBRANE*

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The use of menthol, camphor and eucalyptol in otorhinolaryngology extends back about fifty years. These drugs were introduced on the Continent by the French [1] in 1879, and in 1884 the Germans [2] began a study of them. At that time they were hailed as a panacea for all ailments of the nose and throat, and were used widely in ethereal and alcoholic solutions in concentrations up to 50 per cent. With the reports of several deaths following their use in the noses of children, a more careful study was made of this group, so that a rational dosage was worked out, and a more nearly pure drug was obtained.[3] Today one finds a pure oil in use, free from the troublesome terpene and aldehyde constituents which previously rendered the drugs obnoxious, and rarely does one see them prescribed in concentrations greater than 10 per cent.

It is peculiar that in spite of the wide usage of these drugs, pharmacologists do not entirely agree on their action when they are applied to the mucous membrane. All seem agreed that camphor, menthol and eucalyptol are antiseptic, analgesic and astringent, causing irritation and vasodilation when applied locally to the skin. Yet all are agreed [4] that at least menthol, when applied to the mucous membrane of the nose, causes a vasoconstriction. Their belief is not based on any experimental evidence other than ordinary observation and questioning of the

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* From the Department of Pharmacology of the University of Chicago.

1. Coblentz, V.: Histoire et emplois du camphre, Paris, Monit. Scient., 1909, vol. 4; Chipier, R.: De l'eucalyptus, in Histoire Naturelle France Méd. Paris, 1885, vol. 1, p. 448; Todd, G. B.: Notes on the Eucalyptus Oils Presently Used in Medicine with a Short History of the Oils Used During the Last 10 years, Glasgow M. J. **46**:346, 1896.

2. Gottersdorfer, A. M.: Mitteilungen über Eucalyptus globus, Med. Chir. Centralbl. Wien, **14**:493, 1879; Rosenberg, A.: Das Menthol, ein Erzatz des cocaine zur Erzeugung localer Anaesthesia im Nase und Pharynx, Berl. klin. Wchnschr. **22**:449, 1885.

3. Leraux, R.: Dangers et méfaits du menthol, Presse méd. **20**: 114, 1912; ibid.: Gare au menthol, Rev. hebd. de laryngol. **2**:305, 1912; Lyon, W. D.: Poisoning from Camphor, Phys. & Surg. (Ann Arbor and Detroit) **34**: 134, 1912; McPherson, J.: The Toxicology of Eucalyptus Oil, M. J. Australia **2**:108, 1925; Perrin, M.: Une pommade Camphrie forte, introduite dans les narines d'un jeune infant, peut avoir les mémes inconvenients que le menthol, Province méd. **23**:145, 1912.

4. Cushney: Pharmacology, Philadelphia, Lea & Febiger, 1924; Poulsson: Pharmacology, Leipsic, S. Hirzel, 1909.

patient as to his subjective sensations. As far as I am able to find, after a careful search through the literature, the only evidence that menthol causes a vasoconstriction in the nose was brought out by A. Rosenberg [2] in 1885.

Rosenberg's experiments consisted in local applications of from 20 to 50 per cent menthol in ether and alcohol to the nasal mucous membrane. He reported that in addition to obtaining a local anesthesia of the parts, he observed greater airspace or a shrinking of the nasal mucosa. It is difficult to believe that such highly irritating substances as 50 per cent ether and alcohol, which were used as solvents, could cause anything but extreme vasodilation in the nose. My repetition of his experiments on dogs prove this point to be incorrect.

I have been unable to find that any work has been done toward the study of the effect of camphor and eucalyptol on the nasal mucosa. Yet it is commonly believed among otorhinolaryngologists that these drugs, like menthol, have the property of opening the respiratory passages of the nose. McGuigan,[5] taking it for granted that menthol does open the respiratory passages, believes that this phenomenon takes place through a change in surface viscosity, whereby the bubbles or foam break up, allowing the expulsion of fluid material from the nose or throat.

If an examination is made following the nebulization of the nasal mucosa with these drugs, one notes, instead of an increase in the volume, either no change or an apparently greater crowding of the nose; that is, a decrease in nasal volume. This depends on the drug used. It is true that when menthol is used, on either the pathologic (acute catarrh) or the normal nose, the secretion does become watery, but no opening of the respiratory passages is noted. These facts are substantiated by the experiments to be described.

Using the nasal plethysmographic arrangement described by Tatum,[6] a series of clinical experiments were arranged, working with warm solutions of camphor in liquid petrolatum ranging from 1 to 5 per cent, eucalyptol from 1 to 5 per cent and menthol from 0.5 to 5 per cent. As control solutions, ordinary liquid petrolatum and epinephrine were used. These experiments were then corroborated by similar procedures on the pithed dog, thus eliminating any reflex action which might take place, and of course doing away with the subjective influences so likely to occur in experimental work on human beings.

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5. McGuigan, H.: Menthol and Peppermint in Acute Catarrh Conditions of the Respiratory Tract, J. Pharmacol. & Exper. Therap. **8**:471, 1916.

6. Tatum, A. R.: The Effect of Deficient and Excessive Pulmonary Ventilation on Nasal Volume, Am. J. Physiol. **65**:229 (July) 1923.

APPARATUS

One opening of a recording tambour was attached to an air line, the other to a piece of tubing at the end of which was a nasal tip. With a constant flow of air at room temperature and measured pressure sent through the apparatus, the nasal tip, well covered with petrolatum, was placed in one naris, allowing the air to flow through to the nasopharynx and out through the mouth. By compressing the soft palate against the pharyngeal wall, the naris and postnasal vault become a closed chamber. This was accomplished either by making the sound "K", or by bearing down as at stool. In this manner, the air was made to flow into one naris and out of the other. It is obvious that this mechanism is not entirely without fault. Manipulation of the nasal tip causing the jet of air to strike against the vestibule of the nose disturbed the tambour, and of course might falsify the readings. The muscular efforts made in closing off the nasopharynx are not equal. Certain results were obtained, however, and checked on dogs, in which conditions are more favorably controlled. Normal readings were taken one minute apart. Other readings were taken only once, to avoid changes from abnormal pulmonary overventilation or underventilation. In this series of tracings, the rise of the pointer indicates increased resistance to air and decreasing nasal volume.

CLINICAL EXPERIMENTS

Figure 1 was taken on the nose during a period of three hours to demonstrate changes in nasal volume occurring during this period, while

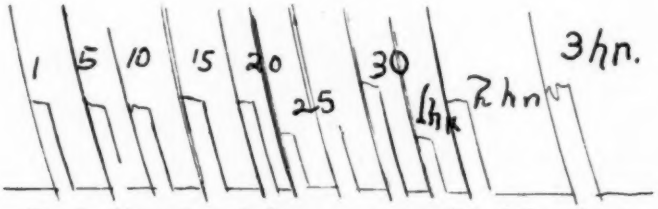


Fig. 1.—Normal nasal changes over a period of three hours.

the subject was at rest. It will be noted that the nasal chambers are continually changing in volume, probably owing to the multitude of reflexes as well as to the variability inherent in this method of procedure. As a control it gives a fair factor of comparison in the experiment to be cited when the period of experimentation is continued over ten or fifteen minutes.

Figure 2 represents the changes seen when ordinary liquid petrolatum is sprayed into the nose. Except for the normal variations noted in figure 1, nothing of significance is seen.

Figure 3 represents readings taken over a period of fifteen minutes, during which time the nasal tip was manipulated, so that the stream of air was directed into the nose at various angles. These tracings indicate the variabilities of this method, that is, the ease with which minor differences in readings may be obtained.

Figure 4 shows the effect of 1 per cent camphor in liquid petrolatum. It will be seen here that no change was noted up to thirty minutes after spraying one naris with the mixture.

Figure 5 shows the effect of 2 per cent camphor in liquid petrolatum. After one minute a mild rise of the writing point (indicating a vasodilation) was noted, increasing up to five minutes, then a gradual return to normal after ten minutes. With the addition of epinephrine, 1:1000, little resistance was met in the nose, and the lever dropped almost to the base line.

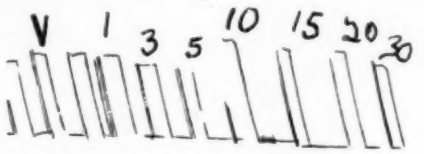


Fig. 2.—Effect of liquid petrolatum.

Fig. 3.—Manipulation of nasal tip.

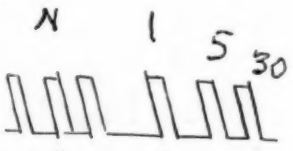


Fig. 4.—Effect of 1 per cent camphor.

Fig. 5.—Effect of 2 per cent camphor.

The effect of 5 per cent camphor in liquid petrolatum is shown in figure 6. After a mild rise for about three minutes, indicating decreased nasal volume, there was a return to normal in five minutes. After from six to eight minutes, the nose was blown slightly to remove troublesome mucus. After ten minutes, the nasal volume again decreased, returning to normal after twenty minutes. Though changes were noted, they were small, as were seen when a more irritating substance, that is, menthol, was used in the nose.

Summary on Camphor—Little effect was noted on the nasal volume produced by from 1 to 5 per cent of camphor in oil. Such minor changes as were seen might be attributed to the body of the oil used, to mucus or to the frequent changes occurring normally in the nose over a period of half an hour.

The effect of eucalyptol 1 per cent in liquid petrolatum is shown by figure 7. In this tracing it will be noted that a slight rise was recorded one minute after the nose had been sprayed. This was normal again at

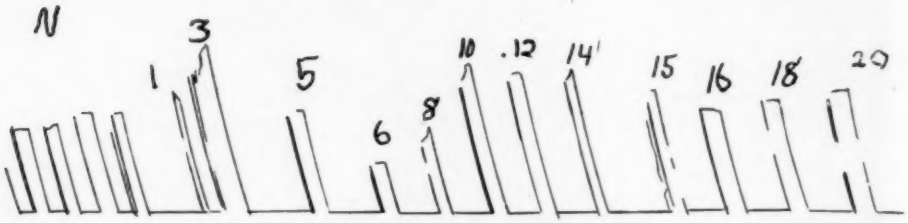


Fig. 6.—Effect of 5 per cent camphor.

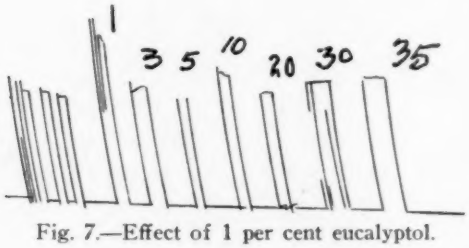


Fig. 7.—Effect of 1 per cent eucalyptol.

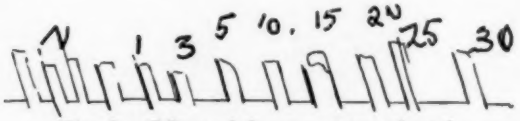


Fig. 8.—Effect of 3 per cent eucalyptol.

five minutes. At ten minutes, a decrease in volume of the nose was noted, while at twenty minutes the resistance was again normal, rising at thirty and thirty-five minutes. These rises were slight, however. It will be seen that at no time was the resistance decreased.

In figure 8, showing the use of 3 per cent eucalyptol in liquid petrolatum, no sharp rise or fall was noted, though a slight increase in volume occurred after three minutes, with return to normal after five minutes. A slight decrease in volume occurred after thirty minutes.

No great change from the normal was noted in figure 9, showing the use of eucalyptol 5 per cent in liquid petrolatum during twenty minutes of observation.

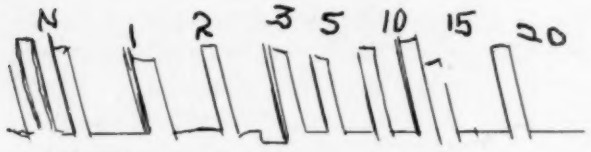


Fig. 9.—Effect of 5 per cent eucalyptol.

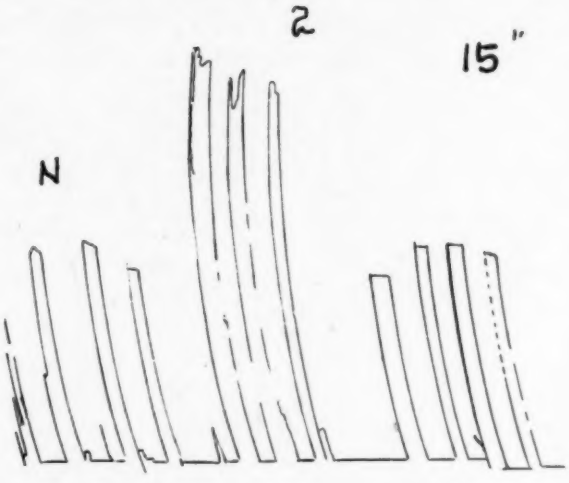


Fig. 10.—Effect of 0.5 per cent menthol.

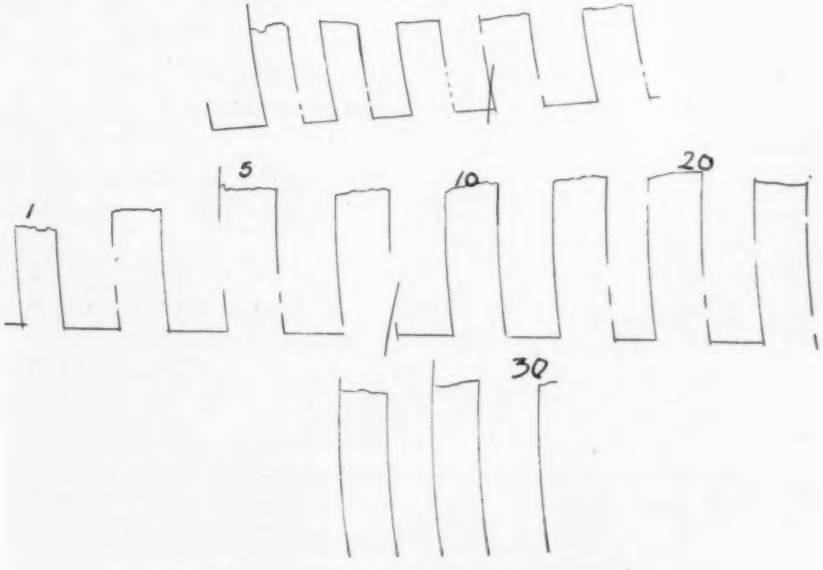


Fig. 11.—Effect of 1 per cent menthol.

Summary on Eucalyptol—No great changes were noted when from 1 to 5 per cent eucalyptol in liquid petrolatum was sprayed into the nose. The minor differences noted might easily be attributed to manipulation, to the physical presence of the oil or to the normal changes in the nose.

It may be seen in figure 10 that an almost immediate decrease in volume to about one-half that noted at the beginning of the experiment occurred after two minutes' use of 0.5 per cent menthol. In less than fifteen minutes the nasal volume was back to normal. Even considering the errors of manipulation, one must concede that here was a definite decrease in nasal volume following the use of 0.5 menthol.

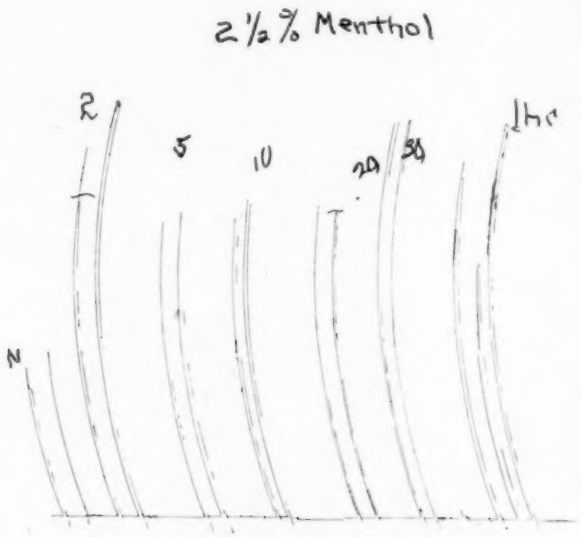


Fig. 12.—Effect of 2.5 per cent menthol.

In figure 11 is seen the result of using 1 per cent menthol in liquid petrolatum. A sharp fall in volume was noted after five minutes, increasing up to thirty minutes.

Figure 12 reveals the effect of 2.5 per cent menthol in liquid petrolatum. This was a particularly crowded nose, so that even the normal resistance was high. However, it is evident that an immediate rise of the writing arm occurred, indicating a further increase in resistance. The nose remained crowded up to the end of one hour. The patient on whom this tracing was made had a rather severe intumescent rhinitis.

Figure 13 was made with 5 per cent menthol. Beginning with a low normal, the nose was almost entirely occluded at the end of half an hour. Application of epinephrine, 1:1000, brought the resistance down almost to zero in a few minutes.

Summary on Menthol—The spraying of menthol into the nose in concentrations even as low as 0.5 per cent causes a decrease in nasal volume, as evidenced by a significantly increased resistance to the stream of air passing through the nose.

Summary of Clinical Experiments—It would seem from the preceding experiments that eucalyptol and camphor have little, if any, effect on the volume of the nose, acting neither as vasodilators nor as vasoconstrictors. Menthol, however, does cause a definite narrowing of the nasal passages, and increases the resistance to the stream of air sent through the nose. Concentrations even as low as 0.5 per cent seem to give this

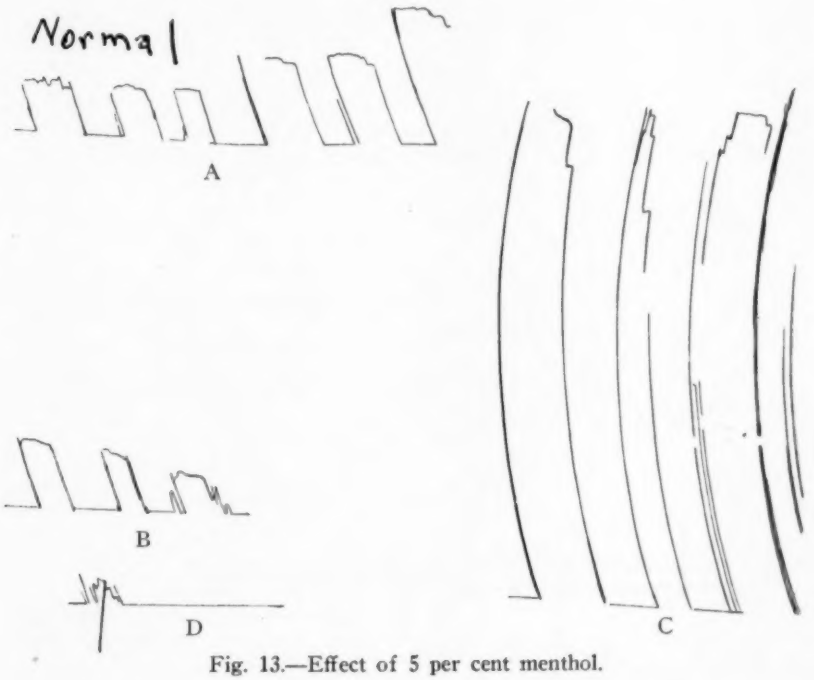


Fig. 13.—Effect of 5 per cent menthol.

result, though the action is not sustained as long as with the higher percentages used.

To corroborate these observations and to throw some light on the action of the drug, that is, to determine whether this is purely a local or a reflex action, further experiments were devised. The animals selected were dogs, because they could easily be pithed, because their noses contain an abundance of vascular tissue and because the nasopharynx can be made air-tight. A continuous stream of air was passed through from one naris, using the other as an outlet. The air pressure was kept constant, and at the point of entrance oily liquids were sprayed into the nose without causing any great disturbance to the system.

In pithing the animal all central or peripheral reflexes are obviously abolished. With artificial respiration, a good preparation could be kept alive for hours.

The solutions used were ordinary liquid petrolatum, 5 per cent camphor, 5 per cent eucalyptol, 1 per cent and 5 per cent menthol. Each experiment was checked by use of epinephrine and by exsanguinating the animal.

It will be seen in figure 14 that following the manipulative efforts a mild increase in resistance was found, but it will be remembered that in the clinical experiments with 5 per cent camphor little, if any, resistance

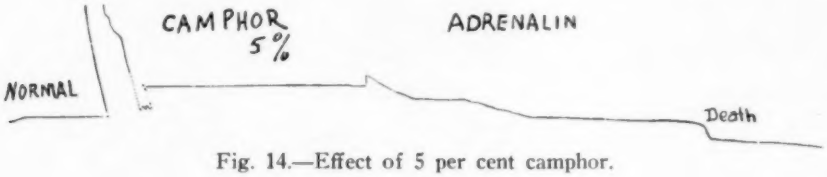


Fig. 14.—Effect of 5 per cent camphor.

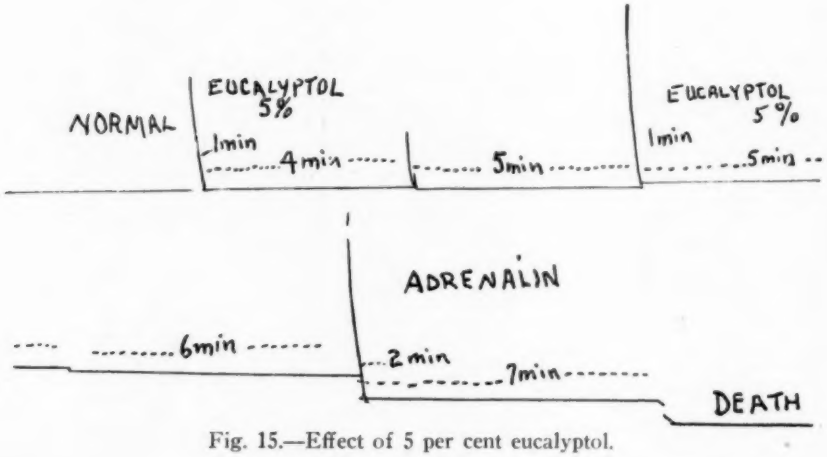


Fig. 15.—Effect of 5 per cent eucalyptol.

was recorded. After fifteen minutes no change was noted, while the subsequent addition of epinephrine soon indicated a gradual shrinkage in the nasal mucosa.

Figure 15 shows the effect of 5 per cent eucalyptol. Little, if any, increase in resistance was noted after ten minutes. After a second application of 5 per cent eucalyptol, a mild decrease was noted, which was probably due to the mechanical presence of the additional oil in the system. After application of the epinephrine a sharp increase in volume was noted (recorder stopped for ten minutes). The animal was then exsanguinated, during which time another drop in resistance was noted as the blood vessels in the nose collapsed.

In figure 16, which shows the result of experiments with 1 per cent and then with 5 per cent menthol, it will be seen that both caused an increased resistance in the nose, which was particularly apparent after the introduction of the 5 per cent menthol. Beneath is indicated the level of the recorder after the application of epinephrine, 1 : 1,000.

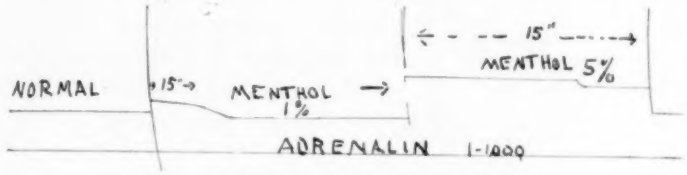
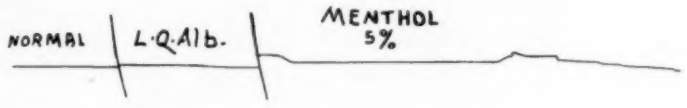


Fig. 16.—Effect of 1 per cent menthol.



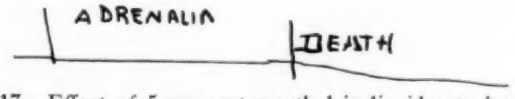


Fig. 17.—Effect of 5 per cent menthol in liquid petrolatum.

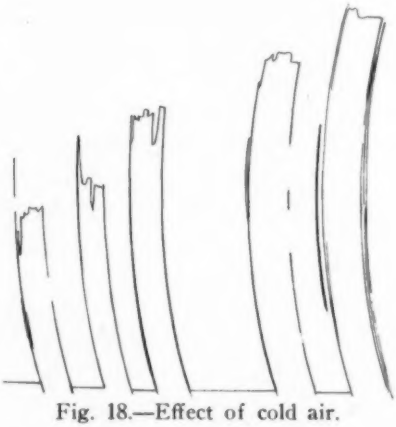


Fig. 18.—Effect of cold air.

Figure 17 reveals a hardly perceptible increase in resistance caused by the introduction of liquid petrolatum. About three times as much oil was used as when the menthol, camphor or eucalyptol were sprayed into the nose. Application of 5 per cent menthol caused an increase in the resistance of the nose, though not as much as that in previous experi-

ments with this solution. Application of epinephrine then caused a decrease in resistance, but not so much as that noted when other preparations were used. On exsanguination of the animal, a gradual drop was noted, indicating an increasing nasal volume.

In conclusion, it may be said that though subjectively it seems that the respiratory passages are cleared by menthol, eucalyptol and camphor preparations, experimentally this is not found to be true.

Goldscheider,[7] in 1886, showed that menthol has a specific stimulatory effect on the nerve "endings" for cold. Rollett later denied this, but believed it to have a specific effect on the nerve endings for both heat and cold.

When one steps out into the cold air from a warm chamber, the air passages seem to become cleared. Yet if a tracing is taken, a decrease in nasal volume will be noted (fig. 18).

Schmitz[8] (1876) and Rosenberg[2] (1885) showed experimentally that menthol is an anesthetic to the mucous membrane. If the mucous membrane of the nose is anesthetized with butyn (which causes little vasoconstriction), and an irritant is painted over the nasal mucosa to cause it to swell, the subjective sensation is that of a clear nasal passage.

From the foregoing it must be concluded that the subjective sensation of cleared nasal passages is not a criterion for the actual state.

In short, the same sensation of cleared passages is obtained through cooling and anesthetizing the nasal mucosa. These stimuli, though differing in intensity, are similar, and cannot be dissociated in the mind.

SUMMARY

1. Menthol acts locally as an irritant to the nasal mucosa in dilutions as low as 0.5 per cent.

2. Eucalyptol and camphor have little, if any, local action on the nasal mucosa in percentages up to 5 per cent.

3. The action of menthol is purely local, producing a sensation of patency, due presumably to the stimulation of the temperature end organs, even though the concomitant resistance to air passages is actually increased.

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7. Golscheider, A.: Ueber die specifische Wirkung des Menthols auf die Temperature Nerven, Arch. f. Physiol., Leipzig, 1886, p. 555.

8. Schmitz, A.: Ueber menthol und seine Wirkung, Centralbl. f. klin. Med. **6**: 537, 1885.

MALIGNANT TUMORS OF THE NASAL SINUSES

A FURTHER REPORT ON THE RESULTS OF THE WIDE OPEN OPERATION FOLLOWED BY IMMEDIATE RADIATION *

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BOSTON

In 1920, at the annual meeting of the American Laryngological, Rhinological and Otological Society, I reported a series of cases of malignant tumors of the nasal sinuses treated by a combination of operation and radiation.[1] The procedure was based on Moure's lateral rhinotomy, but had two important and radical additions designed to overcome certain inherent difficulties in the treatment of malignant growths in this region. These additions were: (1) the cutting away of the soft tissues of the cheek, so as to leave a wide permanent opening in the face, and (2) the immediate radiation of the operative field. In my first paper I described the operation in detail. Therefore, I shall mention here only its salient features, and then take up in turn a few points which a further experience with these tumors has suggested, from time to time, as being vital and interesting.

It is obvious that the first principles of the operative treatment of malignant disease are violated when a tumor is removed, not only without a fair margin of normal tissue but also by a crushing operation which amounts to a curettage. No better method could possibly be imagined for producing local implantations and setting up distant metastases. Yet, on account of the bony surroundings of the tumors, which separate them from the brain and from the eye, no other course is open, except in cases of antral involvement only. It is for this reason that immediate postoperative radiation is used. For, although all of the gross parts of the tumors may be removed, if the cranial cavity has not been invaded or the sphenomaxillary fossa is not too deeply involved, one cannot be certain that minute fragments are not left around the openings of blood vessels in the bone, or that implantations have not been made on the denuded surfaces of the operative cavity. Early recurrence may be expected, unless some method is employed to devitalize these tiny or even microscopic particles of tumor when they are most vulnerable. I believe that immediate radiation accomplishes this, and that it also makes less likely distant metastases, which frequently occur, owing to the crushing nature of the operation. The wide opening in the face is made to facilitate radiation and to convert the entire operative field into a surface

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* Read at the Annual Meeting of the American Laryngological Association, Atlantic City, May 23, 1927.

1. Barnes, H. A.: Boston M. & S. J. **183**:648 (Dec. 2) 1920.

one, which can be inspected easily for evidence of recurrence and is most accessible for treatment, whether by diathermy, radiation or cutting operation, should the contingency arise.

It is my practice to see the patients at weekly intervals during the first four months after the operation. After that, the interval is prolonged, according to the conditions in the individual case. The important point is that any and all suggestive areas are treated as if their malignancy were certain, without waiting for the pathologist's report on the tissue removed. Some of the failures recorded here were due, in part at least, to inability to carry out the foregoing routine.

TECHNIC

The Initial Incision.—In my first series of cases the Moure incision was used. In the subsequent seventeen cases, the incision was as follows: Starting at the outer extremity of the eyebrow, it made almost a complete circle, following the line of the brow and the nasomaxillary suture, then downward and outward across the cheek, sufficiently high just to escape opening the buccal cavity, and continuing outward and upward, to end well out on the malar bone (fig. 1). This incision gives splendid access to all parts of the field, however extensive it may be. In cases without any shadow over the frontal sinus, the incision in the brow is omitted. Experience shows that this is safe, for, although I have opened the frontal sinus in many of the cases because of the shadow in the plate, and have always found pus, polyps and suspicious granulations, I have yet to see one in which the pathologist has reported any

Fig. 1. (patient 13).—The initial incision; epidermoid carcinoma involving the antrum, ethmoid, sphenoid and orbit; dura exposed during operation; no meningitis; died (date unknown) of extensive recurrence.

evidence of malignancy in the tissues removed. The condition in the frontal sinus, then, has been a retention sinusitis, brought about by obstruction of the nasofrontal duct by the ethmoidal tumor; but, in spite of this, I believe such frontal sinuses always should be opened and as thoroughly cleaned out as if their malignancy were unquestioned.

The Control of Hemorrhage.—The operations are always bloody. The hemorrhage, however, can be controlled well by packing, between intermittent attacks on the tumor; and when the great mass has been removed, the bleeding becomes so slight as to be of little moment. In several cases of the later series, the sphenomaxillary fossa was deeply infiltrated by the growth; and, although the bleeding was checked without any serious difficulty, the tying of the external carotid is advised in this class of cases.

The Radiation.—The radiation should be begun immediately. In my earlier cases a tube of radium emanation, of a strength equal to 35 or 40 mg., screened with steel, was placed in the middle of the packing at the close of the operation. This gave an additional screening of at least 1.5 cm. of gauze, which was sufficient to prevent any actual burning of even the nearest surfaces. This tube was allowed to remain in place throughout convalescence. As the strength of the emanation is reduced by one sixth every twenty-four hours, I have roughly calculated that these patients received a total dosage of something over 4,000 mg. hours of gamma radiation. In my later cases the dosage has been about the same but in a much more concentrated form. Tubes of from 100 to 200 mg. strength, screened with 0.2 mm. of platinum and 0.5 mm. of brass, or with 2 mm. of lead, have been used and left in place for from twenty-four to forty-eight hours. The latter method appears to be the more effective.

ETIOLOGY

The Origin of the Growth.—These tumors are often referred to as tumors of the upper jaw. It seems to me that this designation should be reserved for those that arise in the antrum and do not extend beyond its limits. When the ethmoid is infiltrated, and especially when the sphenoid is invaded, the term becomes a misnomer. The primary site of the tumors is often difficult to determine when more than one sinus is involved. Those that begin with pain in and around the molar teeth are undoubtedly of antral origin; while those whose first symptoms are nasal hemorrhage and obstruction probably are primary in the ethmoid. A fair percentage of all the cases belong to this class. The growth often extends into the sphenoid, but primary tumors of this sinus must be rare. It may be asked, "How is it known that the growth did not originate in the sphenoid and extend forward to include one or more of the other sinuses?" The answer is, that if this were so, either the

superior or the external wall of the sphenoid would probably become absorbed early and give rise to cerebral or optic nerve disturbances long before the tumor could invade to any extent the anterior sinuses. I never have seen any symptoms of the eyes in these cases that could not be explained by the mechanical pressure of the growth within the orbit itself, and, although the median partition of the sphenoid was occasionally absorbed, the superior, the external and the posterior walls have, in my experience, always been found intact. This opinion has lately received

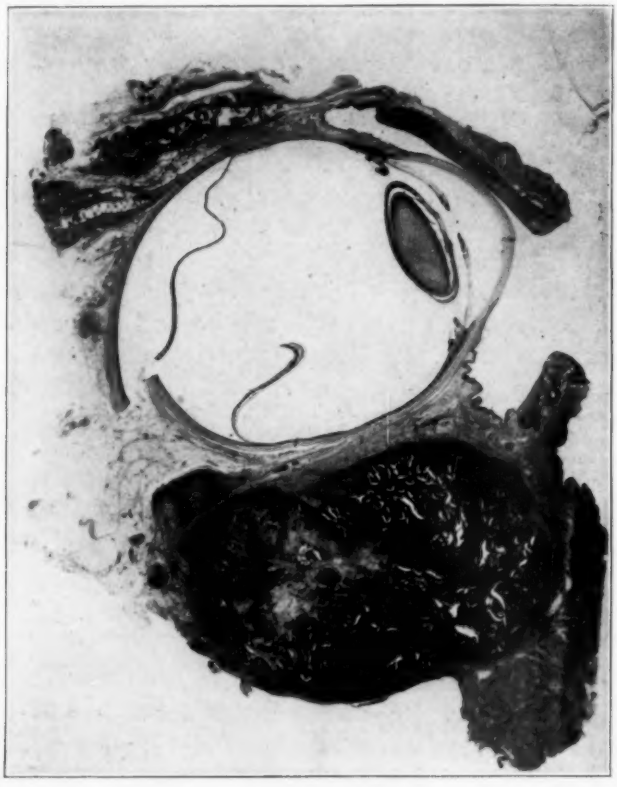

Fig. 2 (patient 25).—Basal cell carcinoma involving the ethmoid, antrum and orbit; the orbit was filled with tumor from the posterior ethmoid which does not show in this section; no recurrence after ten months.

verbal confirmation from Dr. White, who will later report two cases of primary malignant disease of the sphenoid, in which symptoms indicative of such absorption were present before there was any evidence of ethmoid disease.

The Selection of Cases.—The only cases that I have considered inoperable have been those in which there were demonstrable metastases. The extent of the growth, its character and its probable degree of malig-

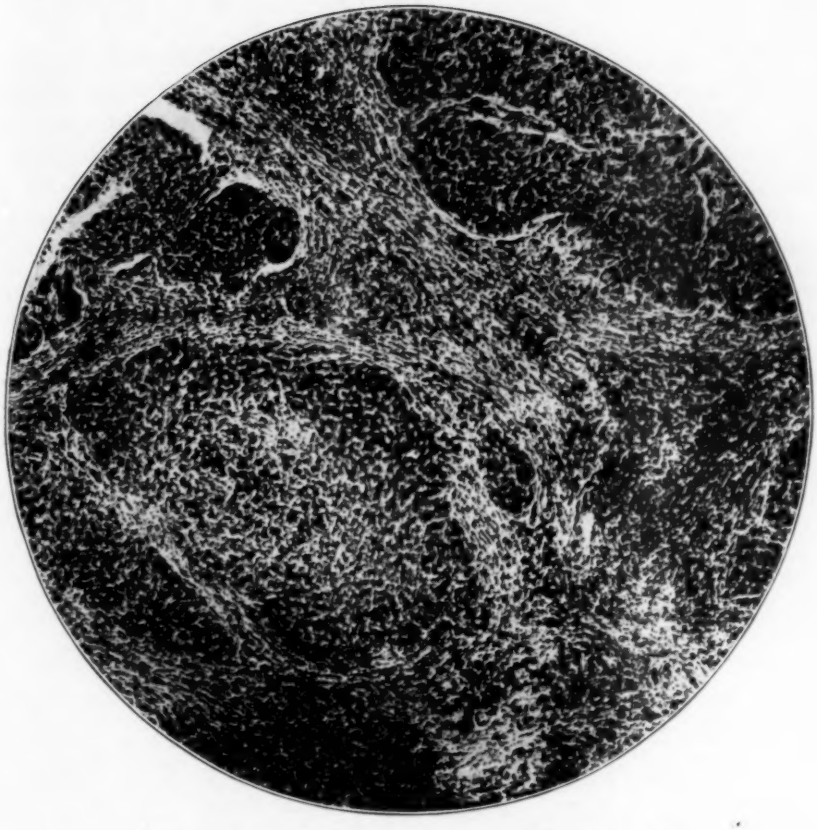

Fig. 3 (patient 25).—Basal cell carcinoma; × 120.

Figure 4

Figure 5

Fig. 4 (patient 25).—Showing orbit, ethmoid and sphenoid; the latter was opened at the operation and found not to be involved.

Fig. 5.—Same patient as in figure 4; a chamois patch is kept in place with collodion.

nancy, as determined by biopsy, have not been considered. The cases, therefore, cannot be said to be selected at all, in that they include, with the aforementioned exception, every malignancy of the sinuses seen by me between the dates, March, 1918, and August, 1926. There are twenty-five in all.

The Variety of Tumor.—In this series there were seventeen carcinomas, nine being epidermoids, one colloid, one basal cell and six unclassified because of the absence of cell differentiation, and eight sarcomas, three being fibrosarcomas, one spindle cell, two small round cell, one lymphosarcoma and one a mixed tumor of the parotid type. This last tumor was exceptional, in that the patient's eye had been removed twenty-six years before, because of a similar growth which originated

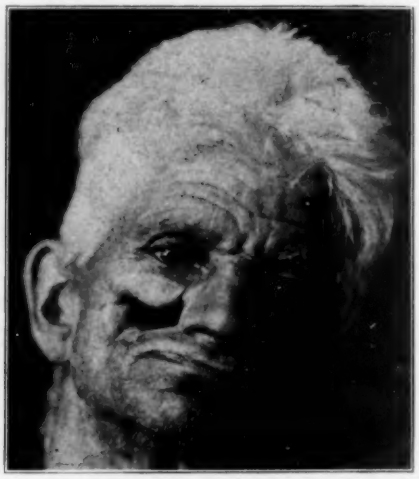

Fig. 6 (patient 20).—Highly malignant carcinoma (no cell differentiation) of antrum, ethmoid, sphenoid and orbit; one of the three cases in which the eye was saved; no recurrence after fifteen months.

in the lacrimal gland.[2] It was then not thought to be specially malignant. Yet, after this great lapse of time, it recurred in the orbit, the antrum and the ethmoid of the same side and proved rapidly fatal from general metastases which were most marked in the bones of the face and the skull.

The Malignancy of the Tumor.—As a class, the epidermoid carcinomas are the most malignant of all tumors arising in the sinuses; but they vary widely in this respect, according to the relative number of undifferentiated cells and, to a less extent, to the number of mitotic figures seen in the sections.[3] The latter characteristic shows also the

2. Verhoeff, F. H.: J. M. Research **13**:326 (Feb.) 1905.

3. Broders, A. C.: Squamous-Cell Epithelioma of Lip, J. A. M. A. **74**:656 (March 6) 1920.

rapidity of growth of the tumor and is, therefore, an indication of the probable degree of its local malignancy. In the table, I have assigned each of these tumors to one of three groups, those of a low, of a moderate or of a high degree of malignancy, according to these criteria. The sarcomas have been judged solely on the basis of the number of mitotic figures. In many of the carcinomas other than epidermoids, there is more or less marked reactionary fibrosis, sometimes even with new bone

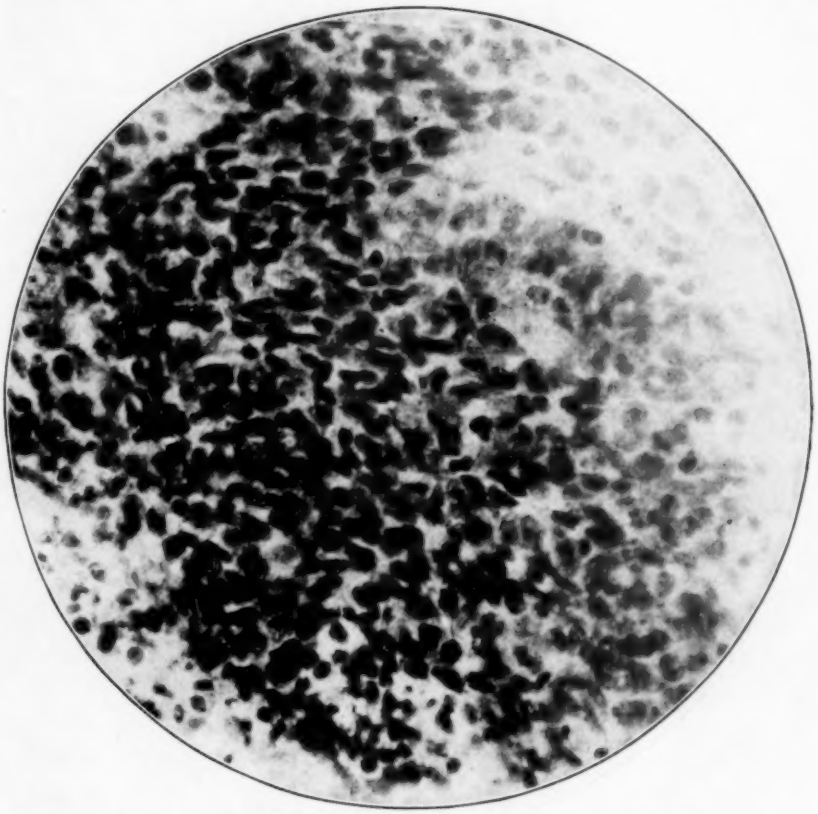

Fig. 7.—Highly malignant carcinoma (no cell differentiation); × 500; patient shown in figure 6.

formation in the stroma, which gives to the growth a density and firmness commensurate to its amount; and from the purely clinical point of view, it seems that the greater the density of such tumors, the greater will their malignancy prove to be. The observation is made tentatively and with diffidence, for further experience to confirm or disprove, since the cases are too few on which to base any dogmatic statement. The only carcinoma in this series that formed metastases in a distant part, without local recurrence and without previous metastases in the glands

of the neck, was one in which the reactionary fibrosis and new bone formation in the stroma was most marked. The primary growth was confined to the anterior ethmoid region, and local recurrence had not taken place at the end of one year, when involvement of the bodies of the lower dorsal vertibrae became evident, and the patient died sixteen months after the operation.

The basal cell carcinomas are said to be but mildly malignant and to respond better than any of the others to radiation. The one case in this

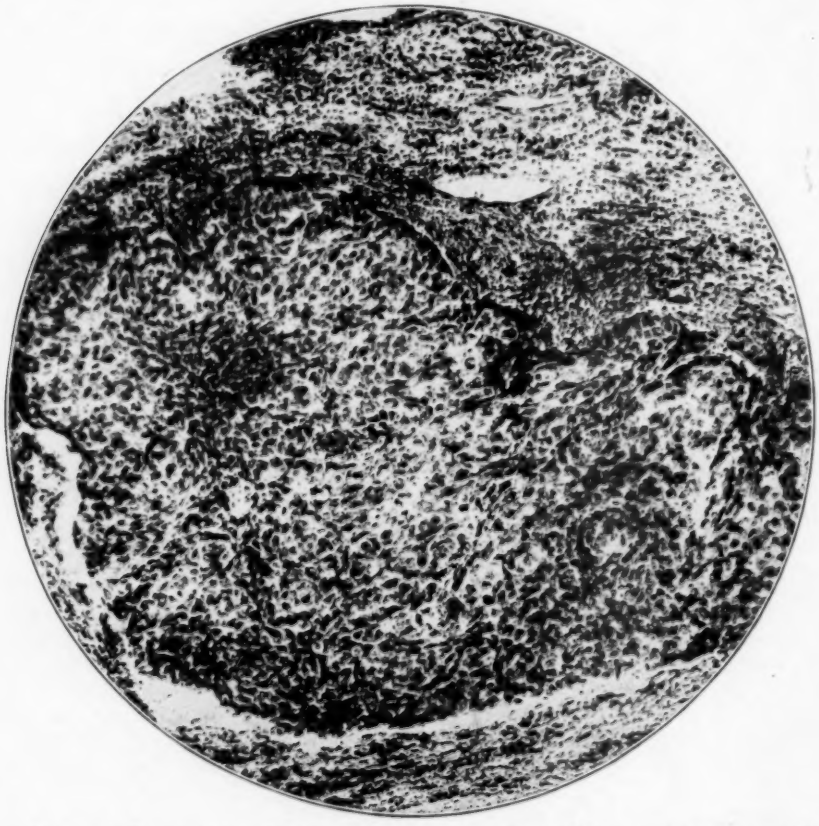

Fig. 8 (patient 21).—Epidermoid carcinoma (× 120) of moderate malignancy; patient shown in figures 9, 10 and 11.

series, although the tumor involved an extensive area, certainly has shown nothing to disprove this statement. The fibrosarcomas of the nose and sinuses have little, if any, general malignancy, as far as my experience goes. When they are removed completely, they do not show any tendency to local recurrence or to general metastasis. In this they differ markedly from the same variety of tumor in some other parts of the body. They have, nevertheless, a serious side; for when they arise

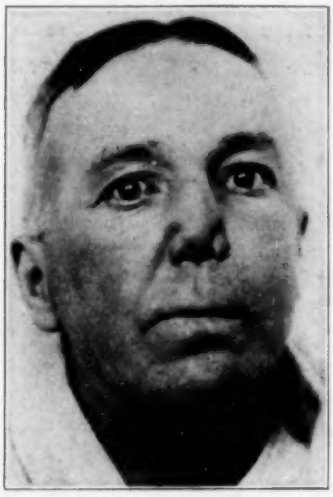

Fig. 9 (patient 21).—Tumor involved the left palate, antrum, ethmoid, sphenoid and orbit; the right sphenoid and posterior ethmoid; the left sphenomaxillary fossa, malar bone, temporal muscle and temporal fossa; the deformity of the nose is an old one and was not caused by the operation; patient well and without recurrence, fourteen months after operation.

Figure 10

Figure 11

Fig. 10.—Same patient as in figure 9; showing the tumor of the palate and alveolar process.

Fig. 11.—Same patient as in figures 9 and 10; showing the patient without the plate which is being made under the direction of Dr. Kazanjian; this plate will cover both the opening in the palate and the opening in the face.

from the ethmoid, as they often do, it may be extremely difficult, on account of the density of the growth, to remove them completely without opening the cranial cavity.

The Extent of the Growth.—In but one case was the antrum only involved. In six cases the ethmoid only was involved; in six, the ethmoid and the antrum; in one, the ethmoid and sphenoid, and in eleven, the antrum, ethmoid and sphenoid. In one instance, an epidermoid carcin-

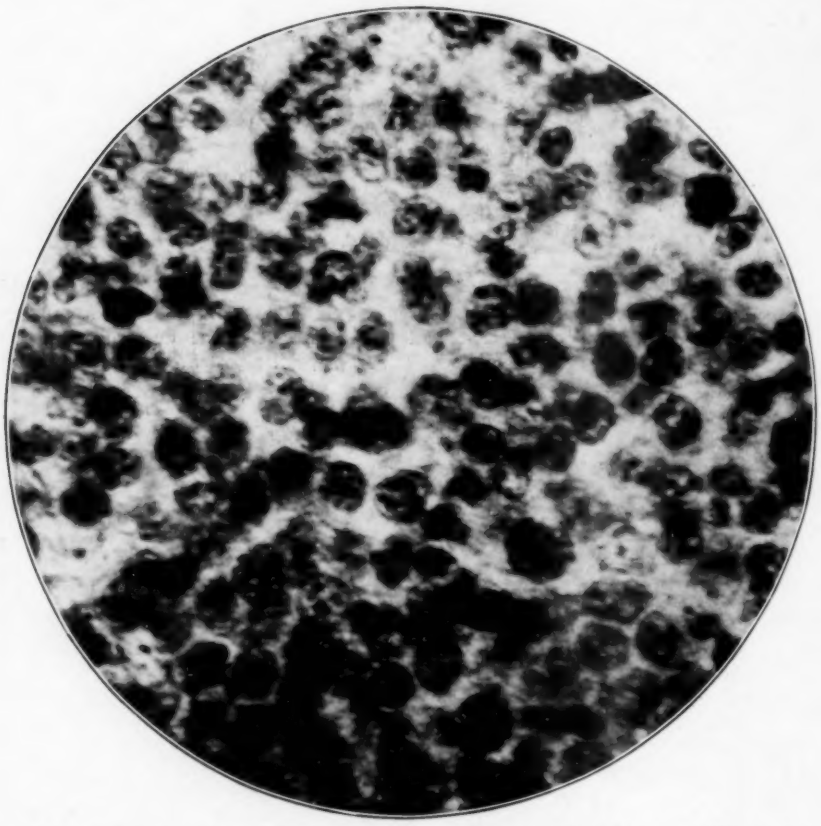

Fig. 12 (patient 18).—Lymphosarcoma (highly malignant) × 1,000; tumor involved the right antrum, ethmoid, sphenoid and orbit; no recurrence after four years.

oma of a high degree of malignancy, one half of the palate, the antrum, ethmoid and sphenoid, the septum and the orbit were involved (figs. 15, 16 and 17). One tumor, an epidermoid carcinoma of moderate malignancy, involved the palate and the septum, the antrum, ethmoid and sphenoid of the same side, the sphenoid and the posterior ethmoid of the other side, the orbit, the sphenomaxillary fossa, the malar bone and the temporal fossa, so that the anterior border of the temporal mus-

Fig. 13 (patient 14).—Highly malignant epidermoid carcinoma; reduced from × 120; tumor involved the left antrum, ethmoid, spheniod and orbit.

Fig. 14 (patient 14).—Tumor involved the antrum, ethmoid, sphenoid and orbit; one of the three cases in which the eye was saved; well and without recurrence five years and four months after operation; the plastic operation on the cheek was done fifteen months after the removal of the growth.

cle was removed at the operation (figs. 8, 9, 10 and 11). Both of these last mentioned patients are well and without recurrence, the first after an interval of nine years, and the second after fourteen months. The orbit was invaded in seven cases. In two of these an exenteration was done. In the other five, an attempt was made to save the eye by thorough removal of the tumor tissue until a clean orbital fat was obtained, the immediate radiation being depended on to devitalize any implantations.

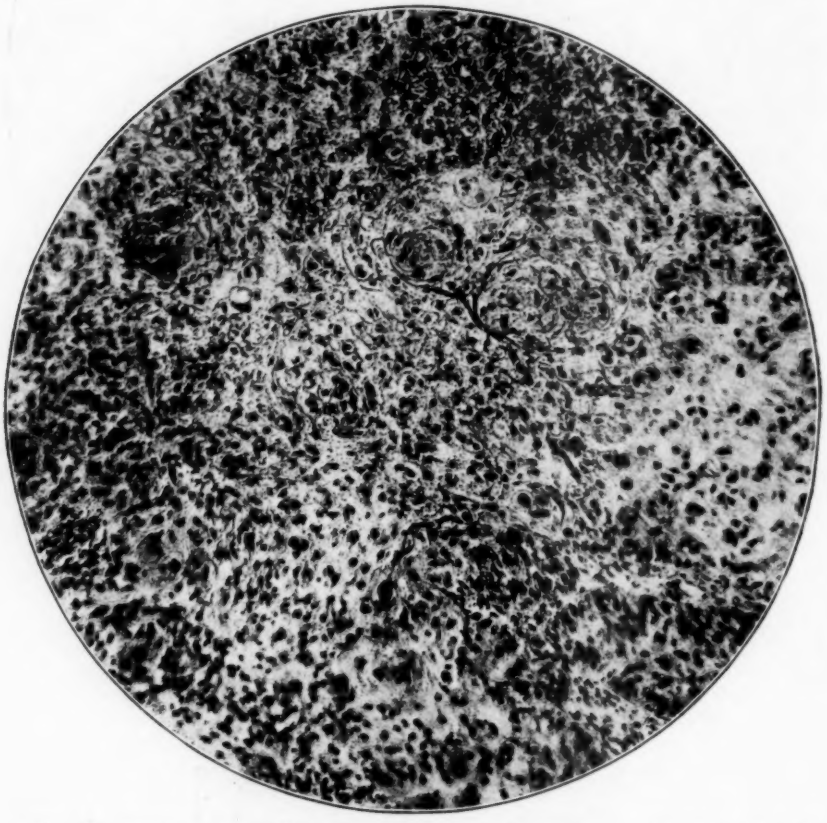

Fig. 15 (patient 1).—Highly malignant epidermoid carcinoma; × 120; showing slight attempts at pearl formation; patient shown in figures 16 and 17.

In two of these cases the attempt was unsuccessful, as recurrence soon took place and the orbit had to be exenterated at a secondary operation. In the other three recurrence has not taken place in the orbit after intervals of nine years (figs. 15, 16, 17), five and one-half years (figs. 13 and 14) and fifteen months (figs. 6 and 7), respectively. In all three of these cases the growths were highly malignant epidermoid carcinomas. These results amply justify the leaving of the eye in all cases of involvement of the orbit in which a clean removal of all gross tumor may

Fig. 16 (patient 1).—Epidermoid carcinoma (fig. 15) involving the right antrum, alveolar process and palate, ethmoid, sphenoid, septum and orbit; one of three cases in which the eye was saved; the turbinates on the left side show through the opening; patient well and without recurrence nine years after operation.

Fig. 17.—Same patient as in figure 16; she wears a dental plate to cover the opening in the palate; the opening in the cheek is filled with a piece of oiled paper—a device of the patient, who does not wish to have a plastic operation.

be obtained without the removal of too much of the supporting tissues of the eyeball. The orbital fat is resistant to infiltration by tumors of whatever sort; and even if recurrence takes place, it may be detected early and the orbit exenterated before the patient has been subjected to a great additional risk of general metastasis.

The Relation of Chronic Sinusitis to Malignancy.—Of the seventeen patients with carcinomas, six gave a history of having had polyps removed from the nose from time to time over a period of some years. In two of them there was a polypoid ethmoiditis, which more or less completely masked the evidence of malignancy, when the patient was first seen. It may be a coincidence that so large a percentage arose on a chronic inflammatory field of this sort. But whether it is or not, the occurrence itself teaches the lesson that no ethmoid should ever be exenterated without careful scrutiny of *all* of the tissues removed.

TREATMENT

The Choice of Methods of Treatment.—The brilliant results of New in the treatment of tumors of the antrum, either with hot soldering irons [4] or (more recently) with diathermy followed by radiation,[5] offer an effective method of treatment which will be preferred by many because of the freedom from bleeding and the absence of scarring. But when the growth extends into the ethmoid or beyond, its limits may be determined with greater accuracy, and it may therefore be removed completely with greater certainty, by the cutting operation. As for the opening in the cheek, it repays the patient many times over for any hurt that the pride may suffer from the deformity, for in no other way can incipient recurrences be detected so surely, and effective treatment applied at a time when permanent cure is a possibility.

The Repair of the Facial Opening.—Theoretically, the opening should remain patent for three years, a period still accepted as a fairly safe time limit for recurrences of malignancies in general. Metastases may, of course, occur after a much longer time, but I am dealing here with the question of local recurrence only, and it has been my experience that such recurrence appears early if it is to take place at all. I have yet to see a case of malignancy in the sinuses, in which a view of every part of the operative cavity could be obtained through the opening in the face, that recurred locally after the cavity had been free from granulations and superficial sloughing for a period of six months. This observation is advanced more for its value in prognosis than as an argument for early closure; however, I believe a plastic operation may be done with comparative safety after one year of absolute freedom from any suspicion of recurrence (fig. 14).

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4. New, G. B.: Tr. Am. Laryng., Otol. & Rhin. Soc., 1920, p. 367.
5. New, G. B.: Tr. Am. Laryng. A., 1926, p. 45.

Cases Studied

No.	Age	Sex	Parts Involved	Variety of Tumor	Grade of Malignancy	Result
1	46	F	Antrum, ethmoid, sphenoid, palate, orbit	Carcinoma (epidermoid)	High	No recurrence after 9 years
2	50	M	Antrum, ethmoid, sphenoid, orbit	Sarcoma (small round cell)	.....	No recurrence after 9 years
3	42	M	Ethmoid and naso-antral wall	Carcinoma	.....	Died 1 year after operation
4	52	F	Palate, antrum, ethmoid, orbit	Carcinoma	.....	Died 8 months after operation (metastases in brain)
5	36	F	Palate, antrum, ethmoid, sphenoid	Carcinoma	.....	Died 7 months after operation; recurrence in sinuses of the other side
6	52	M	Antrum, ethmoid, sphenoid	Carcinoma (epidermoid)	High	Died 3 days after operation (meningitis)
7	50	F	Ethmoid, front wall of sphenoid	Sarcoma (fibro-sarcoma)	.....	No recurrence after 8 year and 2 months
8	40	M	Ethmoid, sphenoid	Carcinoma	High	No recurrence 8 years and 4 months after operation
9	54	M	Antrum, ethmoid, sphenoid	Sarcoma (small round cell)	High	Died 4 years after operation (sarcoma of liver)
10	38	M	Ethmoid and naso-antrol wall	Fibrosarcoma	.....	No recurrence after 6 years and 2 months
11	50	M	Antrum	Spindle cell sarcoma	.....	No recurrence after 3 years
12	38	M	Ethmoid	Carcinoma	High	No local recurrence; died 14 months after operation with metastases in the dorsal vertebrae
13	60	F	Antrum, ethmoid, sphenoid and orbit	Carcinoma (epidermoid)	High	Died of recurrence; time not known
14	55	F	Antrum, ethmoid, sphenoid	Carcinoma (little differentiation)	High	No recurrence 5 years and 4 months after operation
15	60	F	Antrum, ethmoid, septum	Carcinoma (epidermoid)	High	Not traced
16	55	M	Ethmoid	Carcinoma	Low	No recurrence 4 years and 1 month after operation
17	42	M	Ethmoid and sphenoid	Carcinoma (colloid)	High	Died 6 days after operation (meningitis)
18	65	M	Antrum, ethmoid, sphenoid, orbit	Lymphosarcoma	High	No recurrence 4 years after operation
19	42	M	Antrum, ethmoid, orbit	Mixed tumor	.....	Died 8 months after operation with metastases in the bones of the face and skull
20	61	M	Antrum, ethmoid, sphenoid, orbit	Carcinoma	High	No recurrence 15 months after operation
21	53	M	Left antrum, ethmoid, sphenoid, orbit, malar bone, temporal fossa, sphenomaxillary fossa, right sphenoid and posterior ethmoid cells; palate and septum	Carcinoma (epidermoid)	Moderate	No recurrence 14 months after operation
22	55	F	Antrum, ethmoid, sphenoid, sphenomaxillary fossa	Carcinoma (epidermoid)	.....	Patient died during operation for recurrence, 1 year after the first operation
23	50	F	Ethmoid	Fibrosarcoma	.....	No recurrence 13 months after operation
24	66	M	Antrum, ethmoid	Carcinoma (epidermoid)	High	Patient died 2 hours after operation
25	63	M	Antrum, ethmoid, orbit; malar bone extensively involved	Carcinoma (basal cell)	.....	No recurrence 10 months after operation

Operative Mortality.—Of the twenty-five patients, four died as a direct result of the operation (16 per cent). Two of these died of operative shock, and the other two of septic meningitis. In both of the latter, a considerable area of the dura was exposed above the ethmoid during the operation. Such exposure of the dura in this region often cannot be avoided, as the cribriform plate or the horizontal plate of the frontal bone may be absorbed. Even under these conditions, meningitis is by no means inevitable. Two other patients in this series and one patient on whom operation was performed three months ago had a well recognized exposure of the dura at the time of the operation, without any untoward result. In all three cases, a sponge soaked with tincture of iodine was placed against the opening in the bone and kept there during the remainder of the operation. The final pack was of 5 per cent mercurochrome-220 soluble. The patient was put on forced fluids, and 5 grains (0.3 Gm.) of hexamethylemine with 5 grains (0.3 Gm.) of the acid phosphate of sodium were given three times daily. I do not know that this treatment has any value. I know only that meningitis did not develop in any of the cases in which it was used.

Results.—Of the seventeen patients with carcinoma, seven are well and without evidence of recurrence after periods of 10 months, 14 months, 15 months, 4 years, 5½ years, 8 years and 9 years, respectively (41 per cent). Of the eight patients with sarcoma, five are well and without evidence of recurrence after periods of 13 months, 4 years, 6 years, 8 years and 8½ years, respectively, while one patient was well and without evidence of recurrence at the time of his death by accident, 3 years after the operation (75 per cent). Of the twenty-five patients treated, the results have been successful in thirteen (52 per cent). Two patients had a successful local result but died of distant metastases. In one of these instances, a case of carcinoma of the ethmoid, death resulted from metastasis to the bodies of the dorsal vertibrae sixteen months after operation; in the other, a case of small round cell sarcoma, death resulted from sarcoma of the liver four years after the operation.

THE PHYSIOLOGY OF THE "FALSE" VOCAL CORDS AND THE ANATOMY OF THE THYRO-ARYTENOID MUSCLE AND OF THE THYRO-EPIGLOTTIC LIGAMENT

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The function of the ventricular bands or, as they are frequently termed, the "false" vocal cords, has stirred but little interest in laryngology; and though the true vocal cords have been more or less thoroughly studied, little mention of the ventricular bands has been made in the literature. About two years ago, I published in the footnote of an article [1] a preliminary report of a study on the function of the false cords. This paper is an elaboration of that report.

The ventricular band is generally regarded as a relatively inert structure, which has little to do with phonation, and which is composed of folds of mucous membrane covering the true cords and forming the roof of the sinus Morgagnii and its appendix. As a matter of fact, its construction is considerably more interesting. A cross-section of the ventricular bands reveals a fold of mucosa rich in glands, chiefly of the mucous type. This fold covers a fairly massive ligament, to some portions of which are attached muscle fibers with well developed lymph nodules interspersed.

Observation of the muscle fibers in the cross-sections first aroused my interest in the ventricular bands. They are seldom mentioned in the literature, and they are ignored in most textbooks and treatises on the subject. Chiari,[2] in his description of the thyro-arytenoid muscles, says: "Some of the fibers of the muscle lie above the level of the true cords and in this wise the upper fibers of the muscle may bring the false cords in *approximation*." I have carefully dissected a number of larynges, for a thorough study of the intrinsic musculature of the structure, and have found that it is not as simple as it is generally described. Anatomists describe the thyro-arytenoid muscle as divided into two fasciculi, the internal, which is sometimes named the vocalis muscle, and the external. As a matter of fact, on dissection, the muscle resolves itself into six fasciculi which are readily distinguished in a well developed larynx; in all of them the fibers have a different origin, insertion and action.

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1. Josephson, Emanuel M.: Ventriculitis (Infection of the Sinus Morgagnii), Laryngoscope **34**:450 (June) 1924.

2. Chiari, Ottokar: Die Krankheiten des Kehlkopfes und der Luftrohre, Leipzig and Vienna, 1905, p. 16.

STRUCTURE OF THE THYRO-ARYTENOID MUSCLE

The fasciculi of the thyro-arytenoid muscle are described and named as follows: first, the horizontal, which corresponds to what is often termed the vocalis muscle; second, the inner oblique; third, the middle oblique; fourth, the outer oblique; fifth, the transverse, which constitutes the intrinsic musculature of the false cords; and sixth, the superior oblique.

1. Horizontal fibers arise from the fibrous tissue and perichondrium at the anterior commissure and angle of the thyroid cartilage and pass backward to insert into the tip of the processus vocalis and the anterior border of the arytenoid as high as the middle of the anterior border. The action of these fibers is to pull the vocal process forward and inward to the midline and incidentally to tense the true cords. These fibers lie in the true vocal cords and underlie the mucosa forming the floor of the sinus Morgagnii.

2. The inner oblique fasciculus underlies the mucosa of the subglottic space. Its origin is the perichondrium of the inner surface and the lower border of the thyroid cartilage and the cricothyroid ligament. The fibers pass obliquely upward and backward at an angle of about 45 degrees to a musculotendinous insertion in the vocal process and the lower anterior border of the arytenoid. The action of these fibers is to draw the arytenoid cartilages downward, inward and forward.

3. The middle oblique fasciculus arises from the periosteum of the middle third of the inner surface of the thyroid cartilage, and passes upward and backward at an angle of about 35 degrees. The converging muscle fibers twist about spirally and curve over the vocal process to insert into the outer border and external surface of the arytenoid cartilage. A considerable number of the fasciculi insert into the mucosa covering the upper surface of the true cord, which forms the floor of the ventricle. A few of the fibers of this fasciculus attach to the false cord opposite to its attachment to the middle of the anterior border and the outer surface of the arytenoid cartilage. The action of this fascicle is threefold: first, fibers inserting into the arytenoid rotate the vocal process inward and draw the arytenoid forward, second, fibers inserting into the mucosa of the floor of the sinus Morgagnii draw it downward and thus deepen the sinus and also contract the cord in the vertical sense, changing its shape and elasticity, and third, fibers inserting into the false cord draw it downward and evert both the false cord and the ventricle and its appendix.

4. The external oblique fasciculus arises from the upper third of the perichondrium of the thyroid cartilage and passes obliquely upward and backward at an angle of about 65 degrees to insert into the false cord at and above the level of the appendix ventriculi. Its action is to

pull the false cord downward and to evert it, incidentally everting the ventricle and its appendix. Jacobson has noted the fibers of this fascicle which curve above the appendix ventriculi,[3] as has also Rudinger,[4] who described them as constituting a separate and distinct muscle.

5. The transverse fasciculus (a small, thin group of fibers, some of which penetrate the external oblique fasciculus opposite its insertion into the false cord), arises from the perichondrium of the inner surface of the thyroid cartilage to the outer side and above the level of the false

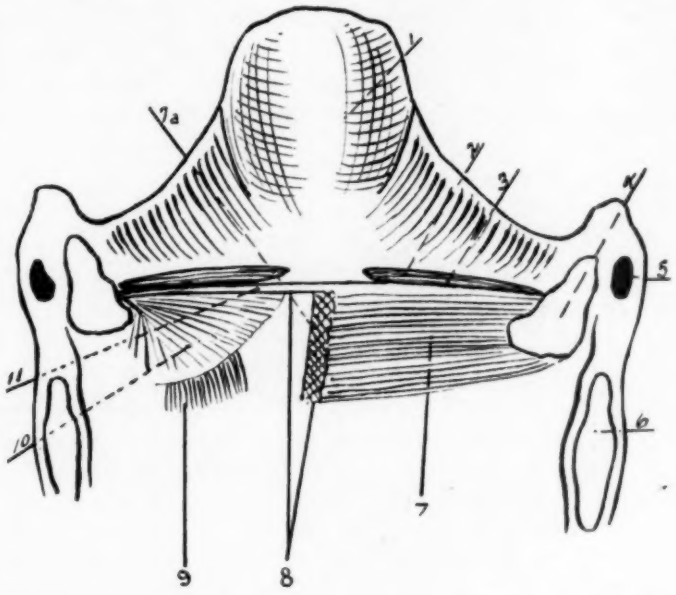

Fig. 1.—Schematic sketch of the fibers of the thyro-arytenoid muscle. *1* indicates the epiglottis; *2*, the false cord; *3*, the true cord; *4*, the arytenoid; *5*, the sectioned interarytenoid muscle; *6*, the cricoid cartilage; *7*, the internal oblique fasciculus; *7a*, the cut fibers of the internal oblique fasciculus; *8*, the horizontal fasciculus; *9*, the external oblique fasciculus fibers showing below the middle fasciculus which covers it above; *10*, the middle oblique fasciculus and *11* the middle oblique fasciculus fibers inserting into the true cords.

cords and, spreading out fanwise in the fold of the mucosa of the false cord which overlies the ventricle, inserts into the ventricular ligament. The action of this fasciculus is to draw the false cords upward and outward, elevating and retracting them so as to expose the true cords and to free them from the dampening influence of the false cords, at the same time elevating the false cord so as to widen the ventricle.

3. Jacobson: Zur Lehre vom Bau des M. Thyroarytenoideus beim Menschen, Arch. f. mikr. Anat., vol. 29.

4. Rudinger: Muskulatur des Taschenbandes, Monatschr. f. Ohrenh., 1876.

6. The superior oblique fasciculus arises from the thyro-epiglottic ligament at about the base of the epiglottis. The small, round bundle of muscle fibers, which is entirely detached from the rest of the thyro-arytenoid muscle, passes obliquely downward and backward to insert into the false cord opposite the base of the arytenoid cartilage. Some of the fibers continue downward to insert into the arytenoid cartilage, in some cases. The action of this muscle is threefold; first, to draw the false cord forward; second, to elevate it, and incidentally to evert the appendix of the ventricle; third, to contract the false cords and cause them to approximate to a slight degree. This bundle of muscle fibers has previously been described by Steinlecher and Tittel.[5] They described its origin as the epiglottis and the insertion as the arytenoids, which is not generally found to be the case on dissection.

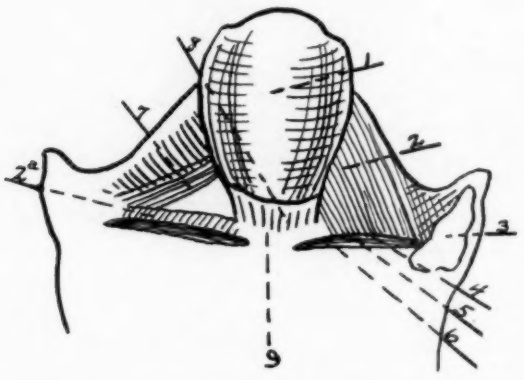

Fig. 2.—Schematic sketch of the ventriculo-aryepiglottic ligament and of the superior fasciculus of the thyro-arytenoid muscle. *1* indicates the epiglottis; *2*, the ventriculo-aryepiglottic ligament; *2a*, the cut ligament showing the underlying muscle; *3*, the arytenoid cartilage; *4*, the ventricular ligament of the false cord; *5*, the ventricle; *6*, the true vocal cord; *7*, the superior oblique fasciculus of thyro-arytenoid muscle, so-called aryepiglottic muscle, and *8*, the thyro-epiglottic ligament.

One of the most important factors in the motility of the ventricular bands, and one which has been entirely overlooked, is the thyro-epiglottic ligament. This ligament is bipartite; between its two leaves are the superior oblique fasciculus and a fatty pad. The median external leaf alone is mentioned by Gray, who describes it as follows: "The thyro-epiglottic ligament is a slender elastic cord which connects the apex of the epiglottis with the internal surface of the receding angle of the thyroid cartilage, immediately beneath the median notch, above the attachments

5. Steinlecher and Tittel: Der M. ventricularis des Menschen, Sitzungsberichte der matematischen wissenschaftlichen Klasses der Kaiserlichen Akademie der Wissenschaft, Wien, 1897, vol. 106, pt. 3.

of the true and false vocal cords." The inner leaf of this ligament, no mention of which is found in the literature but which is readily found on dissection, arises from the anterior surface and the borders of the epiglottis. It is a broad elastic band which passes downward and backward in the aryepiglottic fold to insert into the ventricular ligament through the greater part of its extent. This leaf is more properly termed the ventriculo-aryepiglottic ligament.

This ligament, as I have stated, is the most powerful factor in the motility of the false cords, although it is almost entirely passive in its action. Its effect on the false cord is entirely dependent on the relative position of the epiglottis, the thyroid cartilage and the larynx. On the

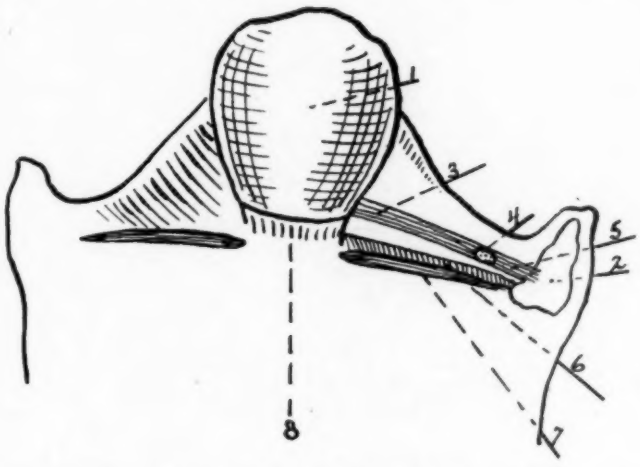

Fig. 3.—Schematic sketch of the superior oblique fasciculus of the thyro-arytenoid muscle. *1*, indicates the epiglottis; *2*, the arytenoid cartilage; *3*, the superior oblique fasciculus descending fibers; *4*, the insertion into the false cord; *5*, the superior oblique fasciculus ascending fibers; *6*, the ventriculo-aryepiglottic ligament, cut away near its insertion to show the superior oblique fasciculus; *7*, the true vocal cord and *8*, the thyro-epiglottic ligament.

vocalization of the lower notes the epiglottis is relatively more depressed than the larynx as a whole; on examination, the epiglottis seems to overlie the larynx. In this position the thyro-epiglottic ligament is relaxed; consequently the false cord drops. In the formation of the higher notes, the epiglottis is elevated relatively higher by the extrinsic musculature than the thyroid cartilage and larynx, which causes a tensing of the thyro-epiglottic ligament and a raising of the false cord which may be noted readily on clinical examination. This ligament serves as a check ligament and antagonist to the external tensor muscles of the cord and as a protagonist to the thyro-arytenoid muscle with which it is a synergist.

The structure of the thyro-arytenoid muscle and of the thyro-epiglottic ligament indicates that there is a fourfold mechanism for the mobilization of the false cords and the incidental widening, deepening and change of conformation of the sinus Morgagnii. 1. The middle oblique fasciculus retracts the cords, deepening the ventricle from below 2. The outer oblique fibers evert and transverse fibers retract the false cords and elevate them slightly; the two sets of fibers also evert the ventricle and its appendix. 3. The superior oblique fasciculus draws the false cord upward and forward, thus changing the conformation of the ventricle. 4. The ventriculo-aryepiglottic ligament powerfully elevates the false cords on vocalization of high notes, when, by the extrinsic musculature, the epiglottis is elevated relatively higher than the thyroid cartilage.

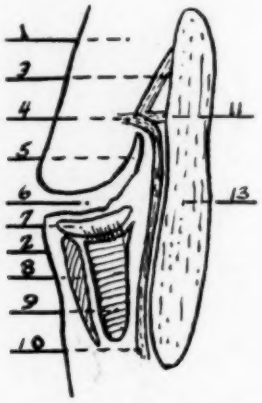

Fig. 4.—Schematic sketch showing a cross section of bundles of the thyro-arytenoid muscle. *1* indicates the false cord; *2*, the true cord; *3*, the superior oblique fasciculus; *4*, insertion of the external oblique fasciculus; *5*, the appendix ventriculi; *6*, the sinus Morgagnii; *7*, the horizontal fasciculus; *8*, external oblique fasciculus; *9*, the middle oblique fasciculus; *10*, the external oblique fasciculus; *11*, the transverse fasciculus, and *13*, the thyroid cartilage.

Physiologically and clinically these actions may be observed in their summation in the examination of a tolerant patient. I reported this observation in the footnote of an article about three years ago,[1] and my observations have been confirmed since then. It will be observed that when the patient initiates phonation both the true and the false cords approximate the midline. The false cords then appear to retract and rise, thus deepening the fissure of the ventricle. The higher the note striven for, the greater is the elevation and the aversion of the false cords. On vocalization of falsetto notes, the false cords vibrate visibly, which may account for the wavering and breaking of the falsetto note.

Concerning the purposefulness of the action of the false cord and the function of the sinus Morgagnii, the last word has not yet been said. Phylogenetically, the ventricle corresponds with the last gill slit

of the embryo and of the lower vertebrate forms. The sensory nerve supply of its mucosa is closely linked with that of the ear and other structures derived from the embryonic gills, as is attested by the reference of pain due to disease or irritation of the intraventricular musoca to the ear. In some forms of vertebrates, such as some of the simians, chimpanzees and others, the ventricle is a structure considerably larger than is generally found in man. It emerges from the larynx over the upper border of the thyroid cartilage to form a large air sac, which

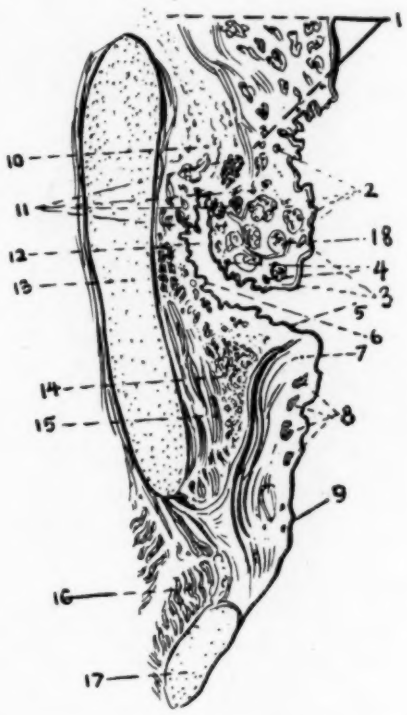

Fig. 5.—Cross section of the larynx. *1* indicates the aryepiglottoventricular ligament; *2*, the secretory glands, mucous and salivary type, in the false cords; *3*, the false cord; *4*, the lymph nodes; *5*, the border of the true cords; *6*, the true cord; *7*, the thyro-arytenoid ligament; *8*, the glands, secretory, in the true cords and subglottic space; *9*, the lower border of the true cords; *10*, the fatty tissue in the false cords; *11*, bundles of fibers of the thyro-arytenoid muscle in the false cords; *12*, the appendix of the sinus Morgagnii; *13*, the thyroid cartilage; *14*, the inner and middle oblique fasciculi of the thyro-arytenoid muscle and muscle vocalis; *15*, the outer oblique fasciculus of the thyro-arytenoid muscle; *16*, the cricothyroid muscle; *17*, the cricoid cartilage and *18*, the ventricular ligament.

supposedly helps to support the head of the monkey when it assumes the erect posture. This air sac which is distended to larger proportions under the influence of the emotions, probably for the purpose of scaring off an enemy and of intensifying its vocalizations by resonance of the air

in the sac. This anomaly sometimes occurs in the human larynx. I have seen a patient in whom, under the stress of the emotions or of exertion, a sinus Morgagnii of exaggerated dimensions dilated to such size as to embarrass respiration. The condition had been diagnosed as respiratory obstruction due to an internally developing, substernal goiter.

Anatomically one finds in the ventricular bands and in the mucosa of the ventricles a marked concentration of glands chiefly of the mucous type. Obviously, a structure so supplied must secrete a rich and copious flow of mucus, which, flowing down over the vocal cords, must lubricate

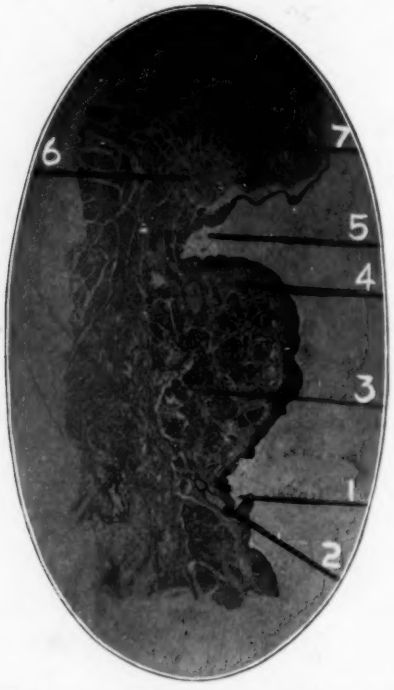

Fig. 6.—Cross section of the larynx near attachment of cords. *1* indicates the sinus frequently found in the subglottic space; *2*, the common duct of group of glands in the posterior portion of the true cords, frequently found as a semi-anomalous structure; *3*, the glands of the posterior portion of the cord and the subglottic space, both mucous and salivary types, forming in this case a compound tubular gland with a common duct; *4*, the true cord; *5*, the sinus Morgagnii; *6*, the ventricular ligament; *7*, the muscular fasciculi of the thyro-arytenoid muscle inserting into the false cord.

them. In their action, the false cords distribute the mucous smoothly over the true cords, so that no drops or gross masses of mucous dampen the vibrations of the true cords. This mucous protects the aglandular surface of the true cords from the desiccatory action of the air currents constantly flowing over them, and also protects them from the infective particles borne by the air. Pathologically, with disease in the ventricle

and the consequent changes of the mucous secreted therein, resulting in the formation of thick tenacious masses of mucoid substance in the ventricle, the most complete type of aphonia that is seen clinically occurs. The true cords are dry and moderately congested.

In addition to the function already described, the false cords have a mechanical protective action. By complete closure, as is witnessed in coughing, they protect the true cords from mechanical insult by foreign bodies which find their way into the larynx from above. In

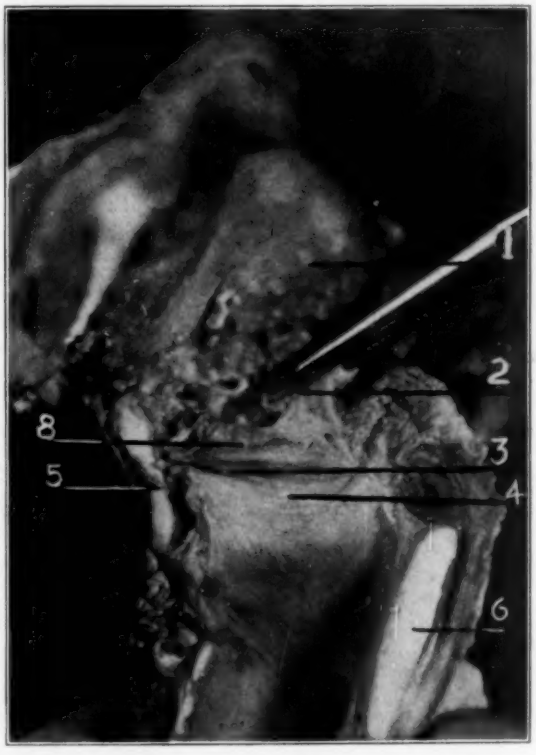

Fig. 7.—Lateral view of the hemisected larynx showing the position of the false cords and the shape of the ventricle when the ventriculo-aryepiglottic ligament is relaxed. *1*, indicates the epiglottis; *2*, the ventriculo-aryepiglottic ligament cut loose from its insertion into the epiglottis; *3*, the sinus Morgagnii; *4*, the true cord; *5*, the thyroid cartilage; *6*, the cricoid cartilage, and *8*, ventricular ligament and the false cord.

quiet respiration, the moist false vocal cords more or less completely overlie the true cords and protect them from currents of air.

The changes in conformation of the sinus Morgagnii, which are brought about by the mechanism herein described, the elevation, eversion, and retraction of the false cords, and the eversion of the appendix ventriculi, as well as the retraction and depression of the true cords,

not only free the true cords of the dampening action of the false cords, but also serve to modify its action as a resonator.

The thyro-arytenoid muscle gives singers their range of tone, and the endurance of their voices depends to a greater extent on this muscle than on any other part of the vocal apparatus. The length, elasticity and tension of its fibers, interrupting the current of expiratory air, impart to it the frequency of vibration which determines the pitch of the tone vocalized. It has been observed that the greater the range and the power of the singer's voice, the higher the development of the fascicles of the

Fig. 8.—Lateral view of the hemisected larynx showing the position of the false cord and the shape of the ventricle when the ventriculo-aryepiglottic ligament is under tension as from an erected epiglottis. *1* indicates the epiglottis; *2*, the ventriculo-aryepiglottic ligament cut loose from its insertion into the epiglottis; *3*, the sinus Morgagnii; *4*, the true cord; *5*, the thyroid cartilage; *6*, the cricoid cartilage, and *7*, the ventricular ligament and the false cord.

thyro-arytenoid muscle. The function of the muscle is manifold: It tightens the cords, changes their form and elasticity, aids in the rotation and adduction of the vocal processes and cords, retracts and elevates the false cords, everts and changes the conformation of the ventricles and their appendixes, and controls directly the production of tones. Its individual fasciculi do not come into full play at once, but act individually

in varying degrees, cooperating with the rest of the vocal mechanism in plicity of tone and nuances. In the vocalization of the higher tones, the muscles of the lower jaw, especially the myohyoid, are second in importance only to the thyro-arytenoid, and their importance in the training of the voice should not be overlooked.

PATHOLOGIC PROCESSES

Pathologically, the structures herein mentioned are of special interest and import. The anatomic structure of the false cords, with their rich array of glands and lymph nodes, and the loose areolar structure and numerous folds; the structure of the ventricles and the ventricle appendices—blind pouches favoring the lodging of infective material and the development of infection, ideal niduses of infection—offer

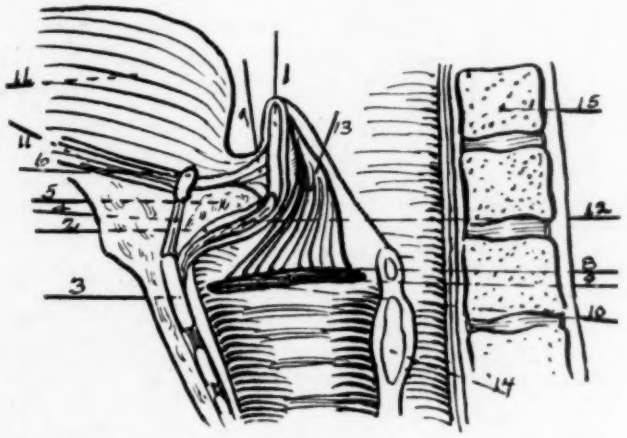

Fig. 9.—Cross section of the larynx and surrounding structures showing the relative positions of the larynx, epiglottis, false and true cords in the formation of tones of the lower range. It will be noted that due to the action of the extrinsic masculature of the larynx, especially the tongue and the myohyoid muscles, the epiglottis lies lower and further posterior in relation to the larynx than in the formation of the higher noted, and due to relaxation of the aryepiglottic ligament the false cord drops, narrowing the sinus Morgagnii. *1* indicates the epiglottis; *2*, the thyro-epiglottis ligament; *3*, the thyroid cartilage; *4*, the hyothyroid ligament; *5*, the fatty pad in the thyrohyo-epiglottis space constituting the laryngeal tubercle; *6*, the hyoid bone; *7*, the hyo-epiglottis ligament; *8*, the false cord; *9*, the sinus Morgagnii; *10*, the true cord; *11*, the muscles of the tongue; *12*, the base of the epiglottis and the tuberculum larynges; *13*, the ventriculo-aryepiglottic ligament; *14*, the cricoid cartilage, and *15*, the spine.

prolific bases for pathologic conditions, and especially for chronic conditions. The only local pathologic change hitherto specifically attributed to the ventricles and the cords by the average laryngologist is prolapse of the ventricle and of the polyp arising from the ventricle, which is the only condition discussed in the textbooks. This is merely the end-stage of a chronic pathologic process of the structures. Unfortunately, laryn-

gologic methods in general use in the past have not permitted an early diagnosis in intraventricular disorders.

Several years ago, I described to doubting confreres, on the basis of clinical and pathologic work, the clinical picture of acute and chronic disease localized in the ventricle and involving the false cords and their function. I presumed to name this condition "ventriculitis." [1] In the early stages of inflammation of the ventricles and the false cords, the consistency of the mucus secreted by them is changed to a thick, stringy, tenacious substance, mucoid in character, which does not flow readily or spread over the true cords, but which forms a mass that lodges in the ventricle and its appendix. The consequence is an aphonia due to

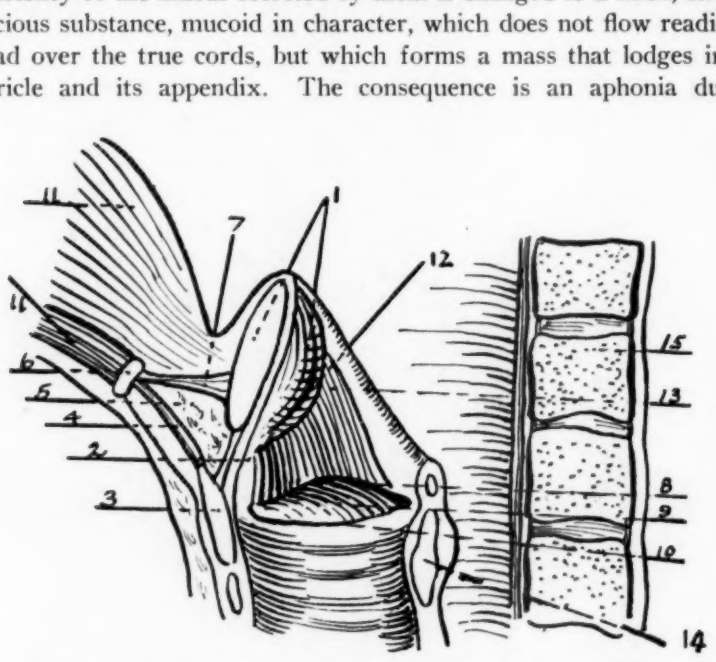

Fig. 10.—Lateral view of the hemisected larynx showing the position of the false cords and the shape of the sinus Morgagnii in the formation of high notes. illustrating the elevation of the epiglottis with consequent tension on the ary-epiglottoventricular ligament. Cross section of the larynx (schematic) showing the relative positions of the larynx and the epiglottis, and the shape of the sinus Morgagnii in the formation of tones of the higher range. The tension of the epiglottis through action of the tongue muscles, on the ventriculo-aryepiglottic ligament results in elevation of the false cords and widening of the sinus Morgagnii. *1* indicates the epiglottis; *2*, the thyro-epiglottis ligament; *3*, the thyroid cartilage; *4*, the hyothyroid ligament; *5*, the fatty pad in the thyrohyo-epiglottis space constituting the laryngeal tubercle; *6*, the hyoid bone; *7*, the hyo-epiglottis ligament; *8*, the false cord; *9*, the sinus Morgagnii; *10*, the true cord; *11*, the muscles of the tongue; *12*, the base of the epiglottis and the tuberculum larynges; *13*, the ventriculo-aryepiglottic ligament; *14*, the cricoid cartilage, and *15*, the spine.

dampening of the vibration of the true cords, which persists until the mass is expelled or removed from the ventricles. As a consequence of the alteration of the nature of the mucus, the true cords are not properly lubricated, are dry and become moderately congested, which favors

serious infection of the cords and of the underlying muscles. In mild cases gross pathologic changes observable in ordinary laryngeal examination may be absent, and laryngeal manipulation and application, with the massage of the false cords which that implies, may clear up the aphonia. Some of these cases may be wrongly diagnosed as hysterical aphonia. As the condition progresses to chronicity, and in the more severe cases, the pathologic changes progress and involve submucous structures. Mucocele, cyst, polyp and prolapse result, with dire effects on the voice. This might possibly be avoided by early intraventricular treatment.

Carcinomas frequently arise within the ventricles. This type of case is most frequently neglected until it is too late to interfere. I have in mind a patient who was seen in Berlin some time ago, and at whose laryngectomy I assisted. Professor Soerensen had seen the patient about two years previously, and from the symptoms suspected a carcinoma. The patient went to a clinic of some renown, the physicians of which had not had such wide experience with laryngeal carcinoma, and the diagnosis was derided. The patient later returned to Professor Soerensen with an immense and demonstrable carcinoma which was almost inoperable. A careful study of the specimen proved that the original site of the lesion was within a ventricle; therefore it has escaped observation in the early stages, although its effect on laryngeal physiology made the diagnosis presumptive.

Tuberculosis also finds its first foothold, in many cases, in this locus minores resistentiae. The ventricles lie in close proximity to the cartilages, and infection spreads to them rapidly. Bearing these facts in mind, I devised several special instruments to facilitate the diagnosis and treatment of intraventricular conditions which will be described in a later paper.

The false cords may become inflamed without any serious involvement of the ventricle. In these cases the false cords may not retract during phonation, and the voice is rough, hoarse and of limited range, often a monotone. It is often observed that on removal of the true cords for growths, the ventricular bands generate a voice which is of much the same quality as that already described. In chronic cases involving the false cords and in growths of the false cords, it might be advisable to remove them, with more satisfactory end-results than are obtainable by deep cautery. At any rate, it would seem advisable when cauterizing the false cords to avoid involving the true cord when the latter structure is not involved by the pathologic process.

In children, the false cords are of special interest. Exaggerated development of the lymph nodules in the false cords occurs in many cases. In these cases one finds the history of frequent attacks of croup,

which is often due to an adenitis of the lymphoid tissue of the false cords and the aryepiglottic folds.

Pathologic changes in the thyro-arytenoid muscle frequently occur secondarily to changes in the overlying structures, but a primary myositis due to an embolic process from a distant focus of infection does occur. Chronic inflammation of the muscles resulting in fibroid changes may be demonstrated pathologically and may be the basis of phonasthenia in some cases.

Judging from a number of observations, hysterical aphonia is probably a composite malady due, on the one hand, to interference with the motor innervation of the thyro-arytenoid muscles and, on the other hand, to interference with secretory innervation of the ventricular apparatus. other hand, to the secretory innervation of the ventricular apparatus. The patient generally feels that there is a mass of mucus in the throat which must be removed before speech will return. On examination it will be found that there is a viscid mass of mucus in the ventricle and some interference with the mobility of the false cords. It is possible that the nervous shock which brings on the aphonia causes an alteration of the nature of the mucus secreted by the ventricular glands which parallels the dryness of the mouth and throat, and that the interference with the motor innervation of the thyro-arytenoid makes the motor apparatus of the ventricle still further incapable of coping with the mass of mucus. An intense stimulus, such as examination of the larynx, or manipulation and application within the larynx with expression of the mucus results in clearing the ventricle, and the return of the voice generally observed. If these methods fail, the wiping out of the mucus from the ventricle will cause the voice to return, provided that the inhibitory stimulus of the shock which precipitated the condition has been removed.

SUMMARY

I have presented facts, observations and hypotheses, many of them novel, in regard to a part of the larynx which has hitherto escaped close study. These facts seem to me to open a new field in laryngology, and I ask my confreres to cooperate in studying these regions which offer many interesting possibilities.

993 Park Ave.

CHRONIC OTITIS MEDIA IN THE TUBERCULOUS

LOCAL ULTRAVIOLET LIGHT TREATMENT *

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AND
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The obstinacy with which chronic otitis media resists treatments is discouraging to the general practitioner, as well as to the specialist. Many therapeutic measures have been suggested for this disease, but the large number of them is proof enough of their inadequacy. On the other hand, the patient, not realizing the obdurate chronicity of the condition, usually blames the physician for incompetency to cure his ear, and starts to make a round of various specialists, without giving any of them time to study the case thoroughly. This difficulty in systematically following up cases of chronic otitis media over a long period must be taken into consideration before one passes judgment as to which of the therapeutic applications is more efficacious. In tuberculosis institutions, cases of chronic otitis media can be followed more or less systematically, as the patients remain for a long period, because of the pulmonary condition.

In our institution, we examine the ears of each patient as a routine, and any change as to etiology, clinical course and results of treatment is noted carefully.

Of 145 tuberculous patients examined in our institution, twenty-three were found to suffer from chronic otitis media. One of us (Lussmann) examined more than a hundred cases in a different institution and found the same percentage; i. e., in about 15 per cent of all tuberculous patients, chronic otitis media was a complication. Of these cases, approximately 80 per cent showed a unilateral involvement, and about 20 per cent presented a bilateral otorrhea.

Of forty-one cases of chronic otitis media studied by us, thirty-seven were classified as far advanced cases of pulmonary tuberculosis and four as incipient cases.

In thirty-two cases, the otorrhea started on an average of about two years after the onset of the pulmonary condition; in nine cases, a few years before the pulmonary lesion began to give any symptoms. Most cases showed periods of remissions and recrudescence at varying intervals.

Smears were made of all the aural discharges, and bacteriologic examinations revealed a preponderance of gram-positive and gram-

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* From the Ex-Patients Tuberculosis Home.

negative staphylococci, associated with gram-negative diplococci; occasional gram-positive and gram-negative bacilli were found. Smears from only three cases revealed acid-fast bacilli; these cases pursued a rather severe clinical course, and the sputum showed innumerable tubercle bacilli. As the severity of the otitis media subsided gradually under heliotherapy, the smears failed to reveal tubercle bacilli.

Unfortunately, guinea-pig inoculations with the material discharged from the ear were made in only eleven cases; at autopsy, four of the animals inoculated revealed a tuberculous lesion. Clinically, however, these four cases of chronic otorrhea did not differ in any way from the other cases included in the group.

It is worthy of notice that all these cases of otorrhea in which the smears revealed acid-fast bacilli and in which the inoculated material gave rise to experimental tuberculosis, revealed numerous tubercle bacilli in the sputum for a long period, whereas in the other cases of chronic otorrhea, there was but little expectoration, and the sputum was mostly negative.

The impression was gained, therefore, that, first, laboratory tests for determining the acid-fast character of the otorrhea are of value only when they are made during an acute exacerbation, and, second, in cases of open pulmonary tuberculosis, the expectorated material might incidently be brought to the middle ear through the eustachian tube, but such material does not necessarily bring about a recrudescence of the otitis media and does not influence its clinical course. It seems to us that a clinical diagnosis of chronic tuberculous otitis media can best be made from the insidious and usually painless onset, the profuse intermittent creamy discharge, at times fetid and bloody in character, the rapid impairment of hearing and, frequently, a bilateral involvement.

It is impossible at the present state of knowledge to give a definite opinion as to what influence the micro-organism has in rendering cases of otitis media chronic, but all those who have examined such cases persistently and methodically will agree that the otorrhea results from arrested tissue repair, which is indicative of poor resistance of the patient. The rational treatment, therefore, should be such as to stimulate a healthy local growth of tissue repair. We have tried many of the therapeutics suggested, such as zinc ionization, iodine, analine dyes, mercurochrome-220 soluble, vaccine, tuberculin and other methods, but none of these methods are as efficacious as ultraviolet light therapy.

It is rather surprising that while light therapy, either in general or in local application, has been widely used in sanatoriums in cases of extrapulmonary tuberculous lesions, such as in the joints, lymph glands and intestines, this treatment has not been tried sufficiently in cases of chronic otitis media, if one is to judge from the scanty reports in

the medical literature. We prefer to use the general term "chronic otitis media" without indicating the specificity of the lesion, because, irrespective of the inciting organism, light therapy is of great value in this chronic condition of the tuberculous.

Rollier,[1] Sheffer[2] and Yandell[3] report favorable results obtained from light therapy in the form of either heliotherapy or mercury vapor and quartz lamp in cases of chronic otitis media. The rational background of ultraviolet treatment in superficial bacterial conditions has been shown experimentally by Bayne-Jones and Van Der Lingen,[4] who demonstrated the bactericidal action of the rays by means of the spectrograph. The bactericidal effect of ultraviolet rays on the tubercle bacillus has been proved by Mayer and Dworsky.[5] The rays cause also a marked local tissue hyperemia when applied to any bacterial infection, and this hyperemia no doubt plays an important rôle in the walling of the lesion.

From the study of this series of patients with chronic otitis media treated with local ultraviolet ray, we concluded that the beneficial effect is derived just as much from the solar rays as from the quartz and mercury vapor lamp, but the modes of application of these two methods differ somewhat, due to the different concentration in the rays. The quartz and vapor mercury lamp is rich in ultraviolet rays, which constitute approximately 25 per cent of the entire radiation, whereas the ultraviolet light of the solar rays amounts to only about 1 per cent, and must be much more concentrated when used therapeutically.

In applying local heliotherapy to the diseased part of the middle ear, we used a concave shaped reflector and an ear mirror made of aluminum or nickel, held in the same position as for an ordinary examination of the ear; the reflected sunlight insures a greater concentration of the ultraviolet rays. When the quartz lamp was used, the rays were passed directly through the ear mirror, since a reflector was not necessary to concentrate the already rich ultraviolet rays of the quartz lamp.

The lesion was exposed to the ultraviolet rays daily, for one minute in the beginning, the time being increased gradually to about thirty minutes in a period of from one to five months. The following changes were observed in most of the cases: the creamy discharge changed its

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1. Rollier, A.: Heliotherapy, London, Trowde and Hodder and Staughton.

2. Scheffer, H.: Beitr. z. Klin. d. Tuberk. **8**:25, quoted by Mayer; Am. Rev. Tuberc. **5**:75, 1921.

3. Yandell, H.: Diagnosis and Treatment of Tuberculosis of Middle Ear, Southwestern Med. **9**:149, 1925.

4. Bayne-Jones and Van Der Lingen: Bactericidal Action of Ultraviolet Light, Bull. Johns Hopkins Hosp. **34**:11, 1923.

5. Mayer, E., and Dworsky, M.: Studies with Ultra-Violet Light, Am. Rev. Tuberc. **10**:166, 1924.

color, became scanty and less fetid, and ceased eventually; the mucous membrane, which was ulcerated, congested and uneven, turned pale red, dry and smooth; the thin margin of the perforation developed reactive granulation tissue, with a tendency to close the perforation, and in five cases the drum closed up completely. However, a complete return to health was rather the exception than the rule.

In seven cases, hearing improved remarkably; the smallest increase in hearing was about 1 meter, and the highest 3 meters, averaging about 1.8 meters for the whispered voice.

In six cases the courses were not changed by the treatment; these patients gave a history of having had "ear trouble" for about ten years. In such cases, the diseased mucous membrane apparently had lost all its ability to give rise to granulation tissue, and even the local stimulation by ultraviolet rays could not bring about the formation of new tissue.

The following bacteriologic changes in the discharge were noticed during the course of treatment. In those cases in which acid-fast bacilli were found, the reactions became negative within one month after treatment was begun and have remained so. The diplococci and the bacilli were first to disappear from all the discharges; only a pure strain of staphylococcus albus persisted for a long time. In many cases the discharge was sterile after two or three applications of ultraviolet treatment.

A word of caution is necessary, for too intense radiation might do more harm than good. Two patients, subjected early to a prolonged exposure, showed a marked reactivation of the chronic otitis media, and the treatment had to be abandoned. Intense radiation causes a melting away of the diseased tissues, whereas mild slow radiation tends to increase granulation, fibrosis and epithelization. This holds true of artificial light treatment, as well as of direct heliotherapy.

SUMMARY

Bacteriologic examinations of forty-one cases of chronic otorrhea in tuberculous patients revealed acid-fast bacilli in three cases only, during periods of acute exacerbation of the disease. Only four of eleven guinea-pigs developed tuberculosis after inoculation with the material discharged from the diseased ear. These cases did not differ clinically from other cases of chronic otitis media.

Although the number of cases reported here is too small to enable us to draw definite conclusions, they nevertheless afford a strong argument in favor of local ultraviolet ray treatment, whether in the form of artificial light or of direct heliotherapy. Only six patients failed to improve under this treatment; they gave a history of about ten years'

duration of the condition, and had extensively destructive lesions. All other patients showed a marked anatomic improvement, and in seven a functional restoration of the ear was noticed.

Excessive radiation might do more harm than good, but mild and slow radiation invariably leads to granulation, fibrosis and even epithelization, provided the destructive process is not too far gone. The ultraviolet rays, whether from the quartz lamp or from the sun, must reach the diseased parts if satisfactory results are to be obtained.

Clinical Notes

COAGULATION TEST*

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I shall present a study of a series of cases which have come directly under my observation. The literature is replete with contributions to the subject; so I have made no attempt to go into statistics from other sources, and can refer to no better contribution along this line than the one made by Hunt[1] in a candidate's thesis presented to this society last year.

The clinical value of blood coagulation tests prior to tonsillectomy has always seemed somewhat doubtful to me, but as they are now employed more or less as a routine in many hospitals, and to some extent in the offices of otolaryngologists, the failure to use such tests, should complications arise, may prove embarrassing to the surgeon. This article is not to be regarded as an argument against making coagulation tests; rather, it is to present a practical study of a subject that has been debated time and again, and to give results obtained in a series of nearly 1,000 cases, all taken from records made since Aug. 1, 1926.

Coagulation tests for several years were made regularly in the otolaryngologic service of the outpatient department of the Memphis General Hospital, which is under the control of the department of otolaryngology, University of Tennessee College of Medicine, and which averages between 700 and 800 tonsillectomies a year. The tests were finally discontinued as a routine, because I found them of no practical value, and I do not recall a single case in which a surgeon refused to operate on account of delayed coagulation time.

Recently I have been directing investigation along this line in the nose, throat and ear clinic of the Memphis Eye, Ear, Nose and Throat Hospital, where it is a routine to make coagulation tests on all patients who have been referred for tonsillectomy. Several of the otolaryngologists working in this institution have such tests made by the laboratory of the hospital in all their private cases.

The technic employed has been Sabrezes' capillary tube and Bürker's slide test, and it is remarkable how these methods have checked up for accuracy, with a slight disparity in an occasional series. The technician in the laboratory has been careful in timing and recording these tests, frequently repeating them if there appeared to be any element of doubt as to accuracy.

The actual number of cases was 982. Of these, 782 checked positively; in the remaining 200, there was a variation of from one-fourth to one-half minute, the longest time being one minute. The capillary method was usually the longer of the two, when there was variation.

The shortest time for coagulation was one minute; the longest, eight minutes. I have noticed that age does not have any bearing on coagulation time; the blood of the aged coagulates as readily as that of the young. It seems to be generally understood that a coagulation time of not over six minutes is sufficient, so far as primary bleeding is concerned; but the unreliability of this rule is shown by my experience. I have had practically no bleeding in cases requiring longer than six minutes for coagulation; the most persistent bleeding reported in this series occurred in a man whose coagulation time was only five and one-half minutes.

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*Read before the American Laryngological, Rhinological and Otological Society, Inc., at the Thirty-third Annual Meeting, May 26, 27 and 28, 1927, at Atlantic City, N. J.

1. Hunt, W. M.: Ann. Otol. Rhin. & Laryng. **36**:187 (March) 1927.

By primary bleeding, I mean, of course, bleeding which occurs at the time of operation or shortly after the removal of the patient from the operating room. Secondary hemorrhages from three to five days after operation are not considered, since these come from infection and sloughs, and may occur in any case, especially in adults. The history of the case in which there was an unusual amount of bleeding follows.

REPORT OF CASES

CASE 1.—A white man, aged 30, seen in the private practice of my assistant, Dr. C. K. Lewis, gave a past history of no importance, except for the patient's statement that he bled easily, and that bleeding was hard to stop. He cited several instances of having cut his finger or cut himself while shaving, when bleeding was obstinate. In consideration of this statement, and for the satisfaction of the patient, who had suggested the advisability of preliminary medication, even though his coagulation time was only five and one-half minutes, he was given 20 grains (1.295 Gm.) of calcium lactate per day over a period of two weeks before operation.

On the morning of the operation the patient was given morphine sulphate, one-fourth grain (0.016 Gm.) and atrophine sulphate, one-one hundred fiftieth grain (0.0004 Gm.). The tonsils, which were not large, were removed under local anesthesia. Dissection and snare were used, and the tonsils came out with capsules intact. Both fossae were clean and, apart from slight bleeding from the right lower pole, which was controlled by a catgut suture, unusual bleeding did not occur. Another suture was taken near the upper pole on this same side, as a matter of insurance.

Three hours after the operation, the patient began spitting bright red blood, and continued to spit small amounts all afternoon. There was a large hematoma on both sides, involving the pillars and the entire soft palate. Bleeding seemed to be more profuse from the left side. The clots were removed, and such bleeding points as were seen were clamped with hemostats, which were left on a short while and then removed, as bleeding seemed to be checked. But the patient bled again twice that night, and as the hemostats tore the tissues and made bleeding worse, pressure alone was then used. The afternoon of the next day the patient began to bleed again, and the performance of the previous evening was repeated. The same thing occurred the next evening, at which time ceanothin was given. There was not sufficient loss of blood to demand transfusion, so coagulin was applied locally, but to no avail. The slightest trauma of the tonsillar fossae or to the engorged and swollen soft palate was followed by a small hemorrhage. When the bleeding seemed to be under control, it would break out again. This condition prevailed for two weeks subsequent to the operation. There was a clot of blood in each fossa, and they bled alternately for sixteen days after the operation. It was found that the bleeding stopped more quickly and was less profuse when the clots were not disturbed. The bleeding did not entirely cease until both sides of the throat were completely healed. The patient did not have fever during his illness, and his pulse rate was never over 110.

When seen two months later, the man had gained so much in weight that he was hardly recognizable, his color was good, and his general condition was greatly improved. He came to the office this time to have his tongue treated. He had bitten it that morning while at breakfast, and had had a steady flow of blood all day. This was stopped with the actual cautery, and the treatment had to be repeated two days later.

Bleeding time would be more valuable, perhaps, than coagulation time, if it could be obtained with some degree of accuracy, but as routine in any clinic or hospital, I should fear that its reliability would be questionable. In patients with a family history of bleeding, the bleeding test should be used in conjunction with the coagulation test, but now and then a case is encountered in which the clinical history serves to cast doubt on the value of these tests, even when they are associated.

As an example I shall cite the history of a case which occurred in the private practice of one of my colleagues at the Memphis Eye, Ear, Nose and Throat Hospital.

CASE 2.—A man, aged 20, came to the hospital for tonsillectomy. When he was 6 years of age, an attempt was made to remove the tonsils, but owing to the amount of bleeding, the operation was incomplete, only a part of each tonsil having been removed. Recently he had had an attack of tonsillitis, and during the last Christmas holidays had had a peritonsillar abscess. When seen he was just recovering from a similar attack. After testing the blood, the laboratory reported that his coagulation time was six minutes, and his bleeding time was seventeen and one-half minutes. It was advised that calcium lactate be taken for a few days before operation. After he had taken 90 grains (5.83 Gm.), the laboratory reported that, while the coagulation time had decreased one minute, the bleeding time was eighteen minutes. The young man was operated on with local anesthesia and dissection, and there was no bleeding to speak of during the operation.

In this case, if the bleeding time had been taken as a criterion, the operator probably would have hesitated about removal of the tonsils, but operative results were contradictory. Such cases may be assumed to be examples of the inconsistency of the bleeding and coagulation tests, and my own clinical experience bears out the conclusion. One case stands out vividly in my mind.

CASE 3.—A girl, aged 17, daughter of a graduate nurse, who, following the extraction of a molar tooth the year before I saw her, bleed unceasingly for twenty-four hours, and had become almost exsanguinated before bleeding stopped, was brought to me for tonsillectomy. Her coagulation time was seven minutes. She was given calcium lactate for several weeks, but it caused practically no change in the coagulation time. Tonsillectomy was performed under general anesthesia, and not more than a teaspoonful or so of blood was lost from each side.

CASE 5.—Another case even more confusing is that of a boy, aged 16, whom I saw in consultation at the Memphis General Hospital, the latter part of April of the present year. He said that he had had a sore throat for several days, for which, on the day previous to his coming to the hospital, his mother had used a solution of mercurochrome-220 soluble. A sublingual swelling developed the next morning, and he was unable to speak. He was expectorating blood when he came to the hospital, and a large sublingual hematoma was found, which was exuding blood. On the posterior surface of his left forearm was a hematoma about the size of a hen's egg.

A definite history of bleeding readily since 2 years of age was given by the patient. His mother's brother bled to death following the opening of an abscess in the leg. A cousin on his mother's side gave a similar history of ready bleeding. At 5 years of age the boy had had infantile paralysis, and one leg was left stiff. When he was 11 years old, the deformity was corrected by an orthopedic surgeon, and following this there was a severe hemorrhage into and around the hip joint, which required a long time for absorption. On the slightest provocation, without apparent trauma of any kind, he now has hemorrhages into various joints.

The laboratory examination of the blood gave a total of white cells, 8,000; polymorphonuclears, 82 per cent; small lymphocytes, 18 per cent; total red cells, 3,110,000; hemoglobin, 70 per cent; platelets, 276,000; coagulation time by pipet method, eight minutes; bleeding time, four minutes.

COMMENT

In this case, history meant everything; coagulation and bleeding tests, nothing. It is remarkable, but a fact, that in a most pronounced "bleeder" of the true hemophiliac type, coagulation time was not especially long, and bleeding time was rather short. One must, of course, make some allowance here for the possibility of faulty technic, but I am convinced that in this case there was a reasonable degree of accuracy, for the blood was taken by a senior intern who was well qualified to do the work.

In persons with hemophilia, one does not expect an increase in the length of the coagulation time, but one does look for prolonged bleeding time. Here was a "bleeder," as was shown both clinically and by the history. His bleeding time by test was but four minutes; on the other hand, in the case previously cited, in which there was no history of bleeding, the bleeding time was between seventeen and eighteen minutes.

With experience so contradictory, it is not surprising that skepticism as to the value of both bleeding and coagulation tests should exist. My own opinion is that such tests have no clinical value, and on scanning the literature I am inclined to believe that this opinion is widely prevalent.

Then, why continue such tests? The answer, so far as I am concerned, is that psychology must be considered. I am frank to admit that this influences me to no small degree. The laity has learned that so-called "blood tests" were made before operating, and in private work, frequently the first question asked is, "Do you make a blood test?" An affirmative reply reassures them.

Now if coagulation tests have no practical value, by what is one to be guided in determining whether the patient is a "bleeder"? Family history is the best guide, undoubtedly, but as hemophilia is not a common condition and occurs only in males, many thousands of apparently useless histories would be taken before a case was found. Occasionally one learns of a death from hemorrhage following tonsillectomy; however, in most of these cases I believe that this occurred, not because the patient was a "bleeder," but because hemostasis was not secured before he left the table. I am convinced that my own cases of postoperative bleeding were due to this, and I, personally, do not believe any kind of coagulation test will aid in the avoidance of postoperative hemorrhages.

Progress in Otolaryngology

A Summary of the Bibliographic Material in the Field of Otolaryngology

ACUTE AND CHRONIC OTITIS MEDIA AND SINUS THROMBOSIS *

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In accordance with the criteria employed in previous reviews, I have limited this summary of the literature published during 1926 on acute and chronic otitic disease and infections of the blood stream resulting therefrom to articles which contain original matter based on scientific observation. Despite this limitation, the literature in 1926 was richer than in other years.

BASIC OBSERVATIONS

The persistent permeability of the eustachian tube after radical surgical treatment of the mastoid has long held the interest of surgeons because of its apparent effect on the end-results obtained from that operation. The aim is to get a closed eustachian tube, as surgical experience has shown that more rapid healing occurs after mastoidectomy with a closed eustachian tube. Since the conception has become general that a "dry" ear is not the ultimate goal sought by radical surgical treatment of the mastoid, the persistent permeability of the eustachian tube has become a less important factor in surgical considerations.

Nevertheless, the studies of Pautow [1] devoted to a consideration of the rôle which the anatomy of the tube plays in otitic disease are noteworthy. Pautow distinguishes between three anatomic types of eustachian tube: first, the straight tube; second, the tube which is S-shaped when viewed from above, but which looks straight when viewed from the side; third, the tube which is S-shaped when viewed from above and which has a distinctly downward curve leading to the tympanic end when viewed from the side. The last named type of eustachian tube is the least permeable. The first named type, which is the most permeable, healed most slowly after radical mastoidectomy. Pautow notes that

* From the Otolaryngological Department of Beth Israel Hospital.

1. Pautow, N. A.: Ueber die Formen der Ohrtrompete, Ztschr. f. Hals-Nasen- u. Ohrenh. **11**:467, 1925.

this first type gave evidence of permitting infection to travel most easily from the nasopharynx to the ear.

The fact that one of these three types of eustachian tube is present in a given case becomes important from the practical standpoint only if it is possible to determine its presence prior to operation; hence the value of the work of Spielberg,[2] who has developed a technic for visualizing the tube on roentgenograms by injecting iodized oil into it. Observations are still lacking relative to the results of surgical treatment in cases in which a record of the anatomy of the eustachian tube had been made before operation; and the putative relationship between the anatomy of the tube and the ease of infection of the middle ear or the rapidity of healing has not been substantiated.

Among the lesions that affect the membrana tympani are two which resemble each other so closely that they are often mistaken for each other. Some types of acute otitis media resemble bullous myringitis; that is, a bleb is found on the tympanic membrane, from which there is an exudate after the bleb breaks. The appearance of such lesions is much like that of myringitis bullosa, a distinct clinical entity unaccompanied by a pathologic condition in the tympanic cavity. Ullmann[3] considers that myringitis bullosa is produced by a filtrable virus which will produce keratitis when placed on the cornea of a rabbit, as does the exudate obtained from herpes, with which it is not identical, however. The exudate from the otitis media with bulla formations on the tympanic membrane fails to produce keratitis when placed on the cornea of a rabbit.

Nakamura[4] worked on experimentally produced tuberculosis of the ear and presents an interesting observation. He finds that experimentally produced tuberculous otitis does not reach the meninges of animals unless it passes through the labyrinth; in other words, infection reaches the meninges, after involvement of the labyrinth, at the internal auditory meatus, through the lymphatic and perilymphatic channels, via the vestibular aqueduct. He stresses this route, rather than the blood stream, as being the usual channel of infection of the endocranium.

However noteworthy this observation may be, every clinician will recall many cases of tuberculous meningitis, apparently secondary to tuberculous otitis, in which a labyrinthine infection was not apparent during the entire course of the illness.

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2. Spielberg, W.: Visualization of the Eustachian Tube by the Roentgen Ray: Preliminary Report, Arch. Otolaryng. **5**:334 (April) 1927.

3. Ullmann, E. V.: Zur Aetiologie der Myringitis Bullosa, Monatschr. f. Ohrenh. **60**:41, 1926.

4. Makamura, M.: Experimentelle Tuberkulose des Ohres mit besonderer Berücksichtigung des Uebergrufens auf gehirn und gesundes Ohr, Arb. a. d. neurol. Inst. a. d. Wien. Univ. **27**:93, 1925.

Nakamura also traced the infection from the meninges to the perilymphatic and lymphatic spaces at the internal auditory meatus, and then to the labyrinth of the opposite side.

Fischer [5] finds that the point of origin of otitic carcinoma is the skin of the external auditory canal. He has occasionally observed that neoplasms arise from the edges of the flaps of skin after radical operations. Fischer also notes that metastases in other organs of the body do not occur in otitic carcinoma, and that this type of neoplasm is only slightly malignant. The condition is uncommon.

In commenting on Fischer's view that the chronically discharging ear is responsible for the malignancy, one is impelled to contrast the frequency of the former with the extreme infrequency of the latter. In view of this discrepancy, Fischer's theory of the causation of otitic carcinoma is hardly acceptable.

Alexander [6] discusses latent otitis and describes four forms. The first is latent otitis resulting from numerous previous attacks. The second is the latent empyema type, in which purulent secretions are drawn into the middle ear from the nasopharynx. It occurs in weak and anemic children. The third is latent meningitic otitis interna, usually produced by *Streptococcus mucosus.* The last is the latent otitis externa, in which the soft tissues are exceptionally flabby and loose.

The term "latent otitis" is unscientific and misleading as a means of describing a pathologic lesion, in that it implies an active infection within the ear which remains dormant for a time. That is not the significance that Alexander attaches to the expression, however. He uses the term "latent otitis" to describe a condition in which the patient does not complain of any symptoms and in which there are no signs of local inflammatory change; in other words, an asymptomatic or painless otitis.

The four clinical types described by Alexander will be recognized as types by any one who has had a wide clinical experience, but the term "latent" should be discarded in classifying them. Even if the term "latent otitis" were used synonymously with "asymptomatic otitis," as Alexander uses it, it could be applied only to infections produced by the *Streptococcus mucosus,* in which a symptomless period is apt to supervene during the active course of the lesion. In the cases falling within Alexander's first group, in which repeated attacks of otitis media occur, the interval between the attacks cannot be considered a period of latency. When the tissues have not returned to normal in such cases,

5. Fischer, J.: Studien zur pathologischen Anatomie des Schläfenbeines, Monatschr. f. Ohrenh. **60**:137, 1926.

6. Alexander, G.: Ueber latente Otitis, Ztschr. f. Hals-, Nasen- u. Ohrenh. **14**:1, 1926.

the patients are more prone to subsequent bacterial attack, but continuous, active infection is not present.

Urbantschitsch [7] continues his studies on otitis caused by *Streptococcus mucosus*. In his most recent article, he comments on the morphologic variations presented by this organism. He remarks that even though it may have caused the otitis, it may not be isolated in culture. In his opinion, this fact indicates that it undergoes bacteriologic variations into transitional forms or into other forms which are recognized as definite types, such as *Streptococcus pyogenes*. Thus, in certain cases, he has isolated *Diplococcus mucosus* at one time and a hemolytic form of streptococcus at another, finally recovering the mucosus on a third culture.

The whole question of the mutation of bacteria receives impetus from such an observation. I have recovered *Streptococcus viridans* and *Streptococcus hemolyticus* in successive blood cultures from the same patient during the course of an infection of the blood stream; and others, notably L. G. Hadjopoulos and Reginald Burbank,[8] feel that transitional forms of bacteria may be found. These forms differ from the primary causative organism in a given case, but exhibit protean properties suggestive of a transitional form.

McKinney [9] discusses various phases of infections of the mastoid and middle ear produced by *Streptococcus hemolyticus*. His statement that the bacteriologist of the Methodist Hospital in Memphis is able to prognosticate the results in streptococcic infections of the blood stream with absolute certainty is extremely interesting. He recognizes several different types of streptococci which he designates as mixed strains, because each is combined with a bacteriophage. The bacterium and bacteriophage are theoretically in balance with each other in the body. When grown on other mediums, however, this balance is disturbed, and one or the other predominates. By observing the individual morphologic characteristics of the bacterium and the appearance of the colonies, the bacteriologist arrives at a conclusion as to whether or not the infecting organism is more potent than the protecting bacteriophage. Substantiation of these observations will mark an advance in the management of infections of the blood stream.

The recent studies of von Schilling in hematology have caused many observers to apply his method of counting the white blood cells in the

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7. Urbantschitsch, E.: Ueber wechselnde Bakteriologische Befunde bei Mucosus-Otitis, Monatschr. f. Ohrenh. **60**:302, 1926.

8. Hadjopoulos, L. G., and Burbank, R.: A Preliminary Study Bearing on the Specific Causative Factors of Multiple Infective Arthritis, J. Bone & Joint Surg. **9**:278 (April) 1827.

9. McKinney, R.: Some Phases of Streptococcic Infection in Acute Mastoiditis, Arch. Otolaryng. **3**:514, 1926.

investigation of otitic infections. Both Heidemann [10] and Levy [11] have reported on the results obtained by its use. The essentials of the von Schilling differential count are the proportion of segmented (polymorphonuclear) and unsegmented (staff) neutrophils. Stress is also laid on the presence or absence of eosinophils, and special significance is attached to the variations in the percentage of eosinophils and of the so-called staff cells. A complete disappearance of the former is indicative of a severe infection; a reappearance of the eosinophils is a good prognostic sign. An increase in the percentage of staff cells (unsegmented neutrophils) is a sign of an increased infection, whereas a decrease following an increase is a good prognostic sign. In any infection, three distinct phases are to be noted in the von Schilling count, the first occurring with the rise in temperature, the second during the activity of the infection and the third in the postinfectious stage.

My experience has verified the prognostic value of the von Schilling differential blood count in acute otitic infections. It should find more general employment in otology. Levy compared the observations obtained from the Fahreus sedimentation test, which was reviewed in last year's summary, with those given by the von Schilling differential count. She found the latter to be a more reliable prognostic sign, because it showed a return to normal more quickly. This is in accord with my own observations of the comparative value of the two methods.

The experimental work on sinus thrombosis by Undritz [12] is noteworthy. He found that experimentally produced sinus thrombosis in dogs has a distinct tendency to spontaneous cure. He also notes that the ligation of the internal jugular vein does not have a noticeable influence on the course of the disease either pathologically or clinically. He records the following observations:

1. In mild cases, the wall of the vessel becomes thickened, and a white thrombus forms, which soon becomes organized and shows no tendency to suppurate.
2. In the virulent type, the wall of the sinus becomes necrotic without the formation of thrombus.
3. In the remaining instances, the wall of the sinus becomes infiltrated and inclines toward a suppurative breakdown. A red, disintegrating thrombus forms, which rarely becomes organized.

Undritz draws general conclusions from his observations on dogs. For example, he considers sinus thrombosis dangerous only when the thrombus disintegrates because of infection. He believes that ligation

10. Heidemann, J.: Das Hämogramm bei den otogenen Infectionen, Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres **22**:203, 1925.

11. Levy, E.: Welche diagnostische Bedeutung hat das Blutbild für die otogenen Krankheiten? Ztschr. f. Hals- Nasen- u. Ohrenh. **13**:495, 1925.

12. Undritz, W.: Ueber den Einfluss der Unterbindung der Vena Jugularis bei experimenteller Sinus Thrombose, Ztschr. f. Hals- Nasen- u. Ohrenh. **13**:204, 1925.

of the internal jugular vein is useless as a means of shutting off the blood current, because other channels remain open. According to him, the jugular vein should be tied off only when the infection has extended to the vein itself.

These conclusions obtained from experiments on dogs, valuable as they are in throwing light on the development of sinus thrombosis, cannot be applied to human beings, because similar, to say nothing of identical, conditions are not present When the sinus of a dog is infected experimentally, there has been no previous otitic disease, and the systemic factors associated with the aural infection are absent. The vein is traumatized directly and infected, and the thrombosis which results is in the nature of a repair process. When the vessel is too virulently infected, a general sepsis supervenes before a protective thrombus can develop, and the anima! dies. Furthermore, the circulation of the dog is different from that of man.

Regarding Undritz's assertion that the jugular vein should be ligated only when it is involved in the lesion, it may be remarked that in actual cases of sinus thrombosis in man there is no clinical way of determining whether thrombus has or has not extended to the vein in the neck. This can be determined only by direct inspection of the jugular vein.

One may accept the final conclusion which Undritz presents, that early obliteration of the sinus and removal of the septic focus within it are prime requisites for the success of surgical treatment in sinus thrombosis. One may pass over the views of Dixon [13] and Chase [14] as personal experiences. Dixon believes that ligation of the jugular vein is not always necessary in the treatment of sinus thrombosis. Chase believes that the jugular vein should not be ligated when bleeding occurs from the distal and proximal ends of the opened sinus.

No general rule can be laid down for treatment in sinus thrombosis. Each case requires minute study of its individual factors. The site of the thrombus, its type (mural or obstructive), the rapidity of its growth, the virulence of the infection, the general reaction of the patient and the duration of the entire disease are the considerations which should determine the judgment of the surgeon rather than any given rule.

CLINICAL STUDIES

Acute Otitis Media.—Recalling Ullmann's experiments and observations on the resemblance of herpes to myringitis bullosa, it is conceivable that he dealt with herpes zoster oticus. In this connection,

13. Dixon, O. J.: Thrombosis of the Sigmoid Sinus Following Skull Fracture, Arch. Otolaryng. **3**:57, 1926.

14. Chase, E. F.: Lateral Sinus Thrombosis with Report of Five Cases, Ann. Otol. Rhin. & Laryng. **35**:790, 1926.

Guthrie's [15] report of three cases of the hunterian syndrome is noteworthy. He found that the distribution of the herpetic eruption took the form of a cone, of which the base was the auricle and the apex was the drum. It is assumed that the entire condition is due to some inflammatory reaction involving the geniculate ganglion of the facial nerve. Care must be taken not to mistake it for an acute infection of the middle ear.

Much of the literature on acute otitis media is devoted to the occurrence of this condition in infancy. Schiloff [16] believes that the type of constitutional development has great bearing on the occurrence and course of otitic infections in infancy and in early childhood. He found that the greatest number of cases occurred in children who had a lymphaticohypoplastic constitution. Children who have asthenic constitutions and those subject to the exudative diatheses also had a high degree of susceptibility. Imhofer,[17] on the other hand, ascribes the greater frequency of otitis in infancy to the lack of resistance to the staphylococcus, streptococcus and pneumococcus, to the straight eustachian tube of infancy, which permits easy access of infection to the middle ear, and to the frequency of the exudative diatheses in infancy. In all probability, it is a combination of the factors enumerated by both Imhofer and Schiloff which produces the marked susceptibility of infants to otitis media.

Imhofer also stresses the importance of toxic diarrhea in association with infantile otitis media, a phase of the question in which Alden [18] has recently revived interest in this country. Alden even goes so far as to advocate mastoid antrotomy when a loss in the infant's weight and diarrhea persist after an adequate incision in the membrana tympani has been made. Of fifty-eight cases of athrepsia and anhydremia, Alden found that the ears were infected in 87.7 per cent. I doubt whether mastoid antrotomy is necessary in infants below the age of 1 year when a proper paracentesis has been performed, as this procedure is adequate to drain the antrum, owing to its superficial location at that age.

Drury [19] advocates the removal of adenoid tissue without administering anesthesia in cases of purulent otitis media in infants. Souper [20] advocates the removal of both the tonsils and the adenoids in the treat-

15. Guthrie, T.: Herpes Zoster Oticus and Allied Conditions with Notes of Three Cases, Lancet **1**:710, 1926.

16. Schiloff, C. N.: De l'influence de la constitution dans les maladies de l'oreille chez les enfants, Rev. de laryngol. **46**:814, 1925.

17. Imhofer, R.: Ueber Säuglingsotitis, Med. Klin. **21**:951, 1925.

18. Alden, A. M.: Gastrointestinal Disturbances in Infants as a Result of Streptococcus Infection in the Ears, South. M. J. **19**:360, 1926.

19. Drury, D. W.: Infantile Otitis Media, Boston M. & S. J. **194**:96, 1926.

20. Souper, H. R.: Scarlet Fever Otitis Media, J. Laryng. & Otol. **41**:233, 1926.

ment of a patient with otitis media following scarlet fever. Both these observers base their conclusions on the opinion that these procedures shorten the course of the otitis.

Hastings [21] and Cullom [22] stress the examination of the rhinopharynx in cases of otitic infection and the necessity of eradicating purulent foci in order to hasten the cure of the aural suppuration.

Chronic Purulent Otitis Media.—Woodhouse,[23] in a study of seventy-four cases of chronic purulent otitis media associated with polyps, treated the patients by simple removal of the polyps. In the forty-eight cases which he was able to follow up, he noted a cessation of the discharge in 62.5 per cent; in 25 per cent of these forty-eight cases no recurrence of the polyps occurred, although the ear remained moist. The remaining patients were unimproved. He recommends the removal of the polyps in all cases of chronic purulent otitis media when no other complications exist, before resorting to the radical mastoid operation.

Aubry [24] also reports a case in which a giant polyp was removed from the middle ear. He stresses the necessity of determining the site of origin from which the growth springs. I would add that not only is it necessary to know the point of origin of the polyp, but extreme care is required in its removal. It is advisable to cut the growth away rather than to pull it out with a snare, as there are cases on record in which meningitis followed employment of the latter procedure when the pedicle was long and attached to some vital endocranial structure.

Chronic tuberculous otitis continues to receive attention. Oppikofer [25] differentiates two types of tuberculous lesions of the ear—the granulating type with caries of the ossicles, and the type in which extensive necrosis appears. Evidences of healing were found in many cases in which the epidermis of the canal was growing into the middle ear and aditus. In more than half of the cases that he studied, the pathologic process was limited to the middle ear. Spohn [26] studied the results of surgical intervention in cases of tuberculous otitis. He reports that a "dry" ear was not obtained in most of the cases in which operation was performed. Even when he found extensive erosions of the mastoid

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21. Hastings, S.: Chronic Diseases of the Ear in Children, J. Roy. San. Inst., London **46**:185, 1926.

22. Cullom, M. M.: Middle Ear Abscess, Laryngoscope **36**:426, 1926.

23. Woodhouse, W. W.: The Treatment of Aural Polypus: An Analysis of Cases to Determine the Value of Simple Removal, J. Laryng. & Otol. **41**:647, 1926.

24. Aubry, M.: Polype géant de l'oreille, Ann. d. mal. de l'oreille, du larynx **44**:845, 1925.

25. Oppikofer: Beiträge zur Histologie der Ohrtuberkulose, Ztschr. f. Hals- Nasen- u. Ohrenh. (Supplement) **12**:500, 1925.

26. Spohn, W.: Beiträge zur Klinik und Behändlung der Mittelohrtuberkulose, Ztschr. f. Hals- Nasen- u. Ohrenh. **13**:580, 1926.

process and petrous bone, endocranial complications never appeared. This bears out the experimental observations of Nakamura. It is the opinion of Spohn that mastoidectomy is indicated in these cases only when an acute infection is superimposed on the chronic tuberculous otitis. In agreement with Spohn, Spencer [27] considers that surgical intervention has only a limited usefulness in tuberculous otitis in adults. In children, however, the lesion is apt to be more extensive and of more serious import, and surgical intervention is more often indicated.

Sinus Thrombosis.—Beck [28] reports a case of sinus thrombosis in an infant 17 months of age. The history and the course of the disease are typical. Beck comments on the rarity of sinus thrombosis in infancy and on the fact that in his case it was caused by the colon bacillus.

Herz [29] also reports two cases of sinus thrombosis in infants. In his paper he opens up the question of the frequency of occurrence of this condition, stating that sinus thrombosis occurs more often in infancy than is conceded by most otologists. His two cases were in infants still in the nursing age who presented signs of a pulmonic infection, one an empyema and the other a bronchopneumonia, concomitant with an acute purulent otitis. Both of these patients had tonoclonic spasms of the upper and lower extremities, and examination of the spinal fluid showed a bloody specimen, which, on standing, yielded a supernatant yellow fluid. At autopsy, both patients showed a thrombosis of the dural sinuses which had its origin in the sigmoid sinuses. Herz contends that although sinus thrombosis is frequently present in infants, it is not recognized because of the concomitance of such conditions as pneumonia, meningitis and gastro-enteritis. These dominate the clinical picture and are erroneously considered the primary disease, whereas in reality they are embolic in origin, the focus being the infection in the lateral sinus. Herz considers that puncture resulting in a bloody specimen with supernatant yellow fluid is significant of sinus thrombosis in cases of purulent otitis and pneumonia in which tonoclonic spasms are present. In substantiation of his views, he calls attention to the older literature and quotes Hamburger, who found that of twenty-six patients with sinus thrombosis, fifteen were under 1 year of age, and nine of these were below 3 months.

While Herz's contentions merit consideration, it is indisputable that in American hospitals, where patients presenting otitic symptoms are

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27. Spencer, F. R.: Tuberculosis of the Middle Ear and Mastoid, Ann. Otol. Rhin. & Laryng. **35**:1073, 1926.

28. Beck, O.: Sinus Thrombose bei einem 17 monate alten Kind, Bacterium Coli, Monatschr. f. Ohrenh. **60**:483, 1926.

29. Herz, O.: Sinus Thrombose in Säuglingsalten, Monatschr. f. Kinderh. **32**:256, 1926.

placed under the observation of otologists from the start, no such proportion of sinus thrombosis in infants as Herz reports is recorded.

By far the most important contributions to the subject of sinus thrombosis are the papers of Ruttin [30] and Hastings.[31] Hastings reports a case of bilateral sinus thrombosis following bilateral mastoiditis, in which both internal jugular veins were ligated and both sinuses obliterated. The patient recovered. Briefly stated, the case is as follows: The patient developed a right-sided sinus thrombosis following a bilateral simple mastoidectomy. The right sinus was obliterated, and the internal jugular vein was tied off. Eighteen days later, the left sinus was obliterated, and the left internal jugular vein was resected. Hastings comments on the fact that the left (second) vein was occluded by a thrombus, and that the circulation on that side was therefore obstructed for some time before the second operation was performed.

Ruttin also reports a case of bilateral resection of the internal jugulars and obliteration of both lateral sinuses. In his case operation on the left side followed operation on the right side after an interval of seven weeks. This patient also recovered.

Ruttin cites untoward events which transpired in other cases following ligation of one internal jugular vein, such as choked disk, abducens palsy and occasionally death. He considers these results due to the fact that the opposite sinojugular venous system cannot accommodate the sudden increase in the flow of blood in the cranial cavity, and a stasis of blood in the cavernous sinus and brain proper results. On the basis of these observations, when both internal jugulars are to be ligated, thus doubling the possibilities of mishap from the source mentioned, he advocates that an interval of time be permitted to elapse between the operations on the two sides. In connection with Ruttin's suggestions, the quotations from Hastings become important. He recalls that Balwin, Dangel and Duval tied off both jugulars at the same time, and the patients lived. Balwin operated for tuberculous cervical glands, Dangel and Duval for carcinoma of the cervical glands. In these cases, however, the sinuses in the skull remained open, and collateral circulation was taken care of through the jugular bulb, the petrosals, the condylars and the vertebral veins. When both internal jugular veins are ligated in the presence of patent lateral sinuses and easy collateral circulation, the situation is not analogous to that presented when the lateral sinuses must perforce be obliterated in the surgical procedure, as done by Hastings and Ruttin.

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30. Ruttin, E.: Ueber Doppelseitigen Jugularisunterbindung und Shädigungen durch Jugularisunterbindung Ueberhaut, Beitr. z. Anat. Physiol. Path. u. Therap. d. Ohres **22**:152, 1925.

31. Hastings, H.: Bilateral Jugular Resection for Bilateral Sigmoid Sinus Thrombosis (Otitic), Arch. Otolaryng. **4**:58, 1926.

Finally, there is one more factor which neither Hastings nor Ruttin stresses sufficiently. In cases of bilateral sinus thrombosis, it may be assumed that only in the rarest instances will there be a simultaneous and equal growth of the thrombus on both sides. The result of this unequal development is that complete obstruction of the blood vessel occurs earlier on one side than on the other, assuming always that an obliterating thrombus is present. This is the factor which permits gradual adjustment of the collateral cranial circulation. By timing the operations so that an interval elapses between them, the collateral circulation has had an opportunity to establish itself naturally before the second operation is undertaken.

In considering the reports of Ruttin and Hastings, it is striking that despite the large numbers of cases reported in the past decade in which sinus infections were found at autopsy, only rare instances of involvement on both sides are on record.

In conclusion, mention should be made of Porter's[32] report on the intravenous injection of mercurochrome-220 soluble in the treatment of patients with otitic sepsis. His results have been good in the four cases in which he employed it. His procedure is as follows: If the patient is very septic, the maximum dose (5 mg. per kilogram of body weight) is not given; instead he gives 3 mg. per kilogram of body weight, repeating the dose after a short time. He feels that small doses allow a gradual load to be thrown on the kidneys, which can be cared for without difficulty. The drug should be given when the temperature is falling rather than when it is rising. In addition, if the red blood cells are below 2,500,000, whole blood transfusion should be given at the same time or before the mercurochrome is administered.

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32. Porter, C. T.: The Newer Methods of Intravenous Therapy in Septicemias of Otitic Origin; Preliminary Report, Boston M. & S. J. **192**:1239, 1925; The Intravenous Use of Mercurochrome in Septicemia, Tr. Am. Laryng. Rhin. & Otol. Soc., 1926, p. 92.

Obituary

HANAU W. LOEB, M.D.

1865-1927

The American Board of Otolaryngology wishes to put on record, as far as the written word may accomplish it, their appreciation of the services of their first secretary, Dr. Hanau W. Loeb.

Dr. Loeb served the board in health and in illness and was working for its interests up to the day he died. He sensed the importance of its mission, and, as was his custom, gave himself unstintedly to it. He gloried in the mastery of detail. He was an exceptional business man and a good executive as well. He was also a man of broad vision and of quick and wide sympathy. All these talents—rarely combined to so great an extent in one man—he put at the command of the board. He looked forward to making its success one of the crowning achievements of his life, and in great measure he succeeded. His successor can be appointed, but his place can never be filled. His companions on the board feel, in recording their loss, that much lies deeper than words can express.

H. P. M.

Abstracts from Current Literature

Ear

PROPULSION VERTIGO. BRUNO GRIESSMANN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:353 (Feb. 22) 1927.

In cases of vertigo the physician is frequently confronted with the anemnesis that "the floor gives way under me," "I must grasp something" or "I fall forward." N. N., aged 38, with vasomotor disturbances, suffered from paroxysmal tachycardia, as he said, on account of overwork. The inner organs, the nervous system and the fundi of the eyes were normal. There was pronounced dermographia and inclination to soft defecation. The strongly alkaline urine contained much calcium phosphate. Several times, while asleep, or on awakening, the patient suffered from attacks of tachycardia which lasted for ten minutes. Violent nervous after-effects had been present, severe and painful tension in the head, a strong pressure toward both ears and a feeling of fulness in them. There were no noises and no diminution of hearing, but the patient had the sensation that the whole body was flying forward. These sudden attacks lasted only for a moment. When the patient was lying on the right side, a forward propulsion was felt; when he was lying on his back, an upward propulsion was noticed.

The propulsion occurred only three times during three days. The equal influence on both labyrinths was caused by vasomotor disturbances. Such vasomotor phenomena occur frequently in neurasthenic and neurotic persons, without organic disease. In the case reported, the strong alkalinity of the urine and the great secretion of calcium pointed to a shifting of ions in the chemical processes in the body.

The therapy of so-called functional vasomotor disturbances of the vestibulary apparatus is discussed comparatively little in textbooks. The ice-cold feet of the patient should be warmed with applications of hot water bottles. Nicotine, coffee and tea should be forbidden during the periods of the attack. A glass of light red wine, at noon and in the evening, has proved to be of merit on account of the deviation of the blood into the dilated vessels of the skin. Diluted hydrochloric acid after meals is recommended to correct the strong alkalinity of the urine and the phosphoruria. For the vasomotor attacks of dizziness, sedatives and mild narcotics are indicated (carbromal, U. S. P., monobromisovalerylurea and small doses of phenobarbital). After the acute symptoms have disappeared, the author prescribes primary sodium phosphate (primary sodium phosphate, 50 Gm., syrup of raspberry, 50 cc., and distilled water to make 500 cc.). A tablespoonful of this should be taken in the morning. Psychotherapy should be considered, because the mind is affected by these attacks of dizziness.

CONCERNING PATHOGENESIS OF THE SO-CALLED DISEASE OF THE OTOLITH. CARL GUENTHER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:362 (Feb. 22) 1927.

The author does not deny the existence of isolated diseases of the otoliths, but he thinks that the proofs are only hypothetic and can be disputed. He refers to the theory of Mygind concerning otolith nystagmus elicited by thermic irritation, to the hypothesis of Thielemann that otolith reflexes are active after a recent elimination of the labyrinth and possibly also to Germán's experiment

with cocaine. It is necessary to refer to pathologic anatomic observations in order to check up clinical observations.

The author reports a case in point. A man, aged 29, who was admitted to the hospital on April 23, 1926, had suffered from violent headaches for two weeks, localized principally in the occipital region and behind the left eye. For one week the patient had had vomiting spells. Five days before admission, while walking, the patient became dizzy and lurched to the side. There was no pain on pressure on the nerve exits, but a facial paralysis on the left side and a coarse nystagmus to the right which increased in intensity when the patient was lying on the left side. There was a slow full pulse and slight paresis of the left arm and hand. The Babinski reflex was absent; the other reflexes were present. The patient was referred to the ear clinic, and the following conditions were found: The soft palate deviated to the right and the tongue to the left. The region of distribution of the right facial nerve exhibited fibrillary twitching. There was a tremor of the right hand. The membrane of the drum and the hearing were normal. There was no spontaneous nystagmus. The Romberg test was positive to the left. The patient walked to the left with closed eyes. There was no past pointing. When the patient was lying on the left side and turned the head only, or the head and body simultaneously, slowly and carefully, a strong third degree rotary-horizontal nystagmus to the right was elicited, accompanied by severe vertigo. When the patient was lying on the right side, no symptoms could be observed. Nystagmus on turning was normal. The caloric test was positive on both sides. Nystagmus occurred without dizziness. Past pointing was normal. The patient died on May 28. The temperature had been subnormal. Necropsy revealed a glioma of the cerebellum, the size of a hen's egg, on the left side. The patient could not be examined according to Voss, but it was established that the movement of the head as the exciting cause of nystagmus, by way of the semicircular canals, could be excluded.

It becomes more and more a question whether the complex of symptoms named disease of the otoliths can be of peripheral origin without the participation of reflexes of the neck, or without other cerebrospinal factors. Germán and others answer in the affirmative.

Arguments against this are as follows: 1. In highly developed animals, as experiments prove, the otolith reflexes play an inferior part; they could be demonstrated only in certain cerebrospinal conditions (derecebration). An isolated disturbance would not show any symptoms.

2. In man, only certain cerebrospinal diseases (hemiplegia, tumors of the cerebellum) showed reflexes in the neck and otoliths.

The case reported by the author confirms the objections to the view of Germán. Goldstein thinks that only a diseased cerebellum opens the way for the reflexes of the neck and otoliths, after elimiting the modifying and impeding effect on all kinds of tonic reflexes. The center and paths of the otolith reflexes are unknown. Pette claims that in the adult man, contrary to the animal, tonic reflexes in the neck presuppose an injury of the pyramidal and extrapyramidal system, and that tonic reflexes in the labyrinth could never be elicited in the healthy man.

Importance of the Vestibulary Apparatus in Aviation. F. Leiri, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:381 (Feb. 22) 1927.

The author has shown previously that the otolith apparatus is of importance while falling. Kremer was the first to show that vegetative vestibulary

reflexes must be considered otolith reflexes. The question arises whether the otolith apparatus is of importance in flying when an extensive falling motion takes place. Ferry states that the majority of flyers suffer from a strange oppressive sensation, of short duration, when the aeroplane strikes a cold air pocket. A peculiar loss of strength is noticed, the legs become weak, all motions become uncertain and unskilful and lose their strength. The face becomes pale, there are noises in the ears, and vision becomes clouded for a moment. These slight disturbances may reach the status of syncope if the flyer remains in the air pocket a long time. Flyers should be tested in order to ascertain to what degree they are able to innervate a tonus, cortically, during a fall. Ferry states that under these circumstances some flyers suffer from violent vomiting. Leiri claims that during the motion of falling and in sea-sickness, a vestibulary induced tonus is substituted for the contraction of the wall of the gastro-intestinal tract, which is normally produced by the contents of the tract, and that this tonus is counteracted by the action of the sympathicus when the falling motion stops suddenly. The author states that the fall in blood pressure which Ferry has observed after landing is caused by otolith reflexes during descending, and that this decrease persists after landing, because no sudden impulse takes place to counteract the otolith reflexes which caused the decrease. It would seem that the regulation of the blood pressure during the flight is not always sufficient. Attacks of unconsciousness have caused accidents. Head has called attention to the fact that the stability of the flying machine is of importance in order to reach a state of equilibrium without guidance when the flyer becomes unconscious. A fast-flying machine with one seat may cause a fall of grave consequence, because it cannot balance without effective steering. Head thinks that dizziness occurs in flyers who from childhood have suffered from hyperexcitability of the vestibulary apparatus (feeling of uneasiness while swinging) or of the optic apparatus (railroad sickness caused by visual impression of quickly passing objects). Unconsciousness develops in those flyers in whom resistance against vertigo is great, as has been shown by the turning experiment. Leiri refuses to accept this statement, and claims that unconsciousness is caused by disturbance of the circulatory organs, and that it is the consequence of the rapid falling motion.

Concerning the significance of the apparatus of the semicircular canals in aviation, Leiri states that the observations of the neurologist and flyer, van Wulfften Palthe, furnish additional proof that the vestibulary apparatus is of no significance in the transmission of conscious observation of motion. Vertigo elicited by the apparatus of the semicircular canals may disturb the flyer. Van Wulfften Palthe has shown that only during "spins" (circulatory flying in the frontal plane around a vertical axis), when the machine moves toward the ground, does the angular velocity (from 120 to 180 degrees a second with the machine used by van Wulfften Palthe) become so great that vertigo occurs, whereas an angular velocity which may cause vertigo does not occur in "turns," "loopings" and "rolls." Van Wulfften Palthe therefore recommends that, during spinning, the flyer should bend his head 90 degrees (that is, he should look at the floor of the cabin). Severe sensations of vertigo may be thus avoided, and after the "spin" movements are completed, the aviator avoids the danger of wrong steering through reflex contractions of the muscles (corresponding to the fall movement after turning) when flying again in a straight line. Van Wulfften Palthe describes another form of vertigo which is caused during a sharp turn, while looking along the upper wing. This vertigo is noticed especially by beginners, but a feeling of uneasiness is also present in experienced aviators, because there is a discrepancy between what is seen and what

is felt. One sees that one is turning quickly, but one does not feel it. When the eyes are closed, the sensation disappears. Leiri states that the phenomenon is caused by absence of nystagmus while looking along the upper wing. In a circulatory flight to the right, when looking toward the right along the lower wing, nystagmus occurs, whereas nystagmus does not occur when looking toward the left along the wing turned skyward. Surrounding objects can be fixed by nystagmus. Vertigo does not occur while the flyer is looking toward the right. While the flyer is looking toward the left, along the wing pointed skyward, the eyes cannot fix the passing optical space, because there is no nystagmus, and this may cause vertigo, just as in a railroad train the passing objects cannot be fixed in spite of the optical nystagmus (railroad nystagmus). It can easily be shown that nystagmus movements counteract the development of optical vertigo. If one turns several times with moderate velocity around one's axis, as a rule, vertigo is not experienced. If one fixes the eyeball by pressure on the side (in order to avoid double vision, the other eye should be covered), the same motion causes a distinct feeling of dizziness combined with uneasiness.

Microscope for the Ear Magnifying from Ten to Fifty Times. Ery Luescher, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:403 (Feb. 22) 1927.

So far the membrane of the drum has been inspected either in its natural size, or with a magnification of from two to five times. Greater magnifications allow a better diagnosis. Old and recent perforations, fine scars versus defects, transudation lines and other conditions can be recognized with certainty. The various degrees of tension are easily visible, also the current of the blood in the capillaries and veins. Several instruments have been devised by others. The author's apparatus and the technic are described in detail. The speculum and the microscope are not solidly connected, but allow a space of 5 cm. between them. The membrane of the drum is magnified from ten to fifty times. The patient is not made uncomfortable. All parts that can be inspected by ordinary inspection are made visible. The apparatus allows:

1. A magnification from ten to fifty times with ordinary light.
2. A magnification from ten to fifty times with light free from red rays.
3. Observation of processes of vibration through the Siegle speculum in a magnification from ten to fifty times.
4. Binocular observation.
5. Simultaneous observation of the magnified picture by two observers.
6. Measurements of the visible portion of the ear in three dimensions.

Pachymeningitis Hemorrhagica Interna from the Otologic Point of View. Stephan Krepuska, Ztschr. f. Hals-, Nasen- u. Ohenrh. **17**:419 (Feb. 22) 1927.

The possibility of pachymeningitis hemorrhagica must be considered if in an exacerbation of acute chronic otitis there occur a rise in temperature, violent headache, a quickly developing rise of intracranial pressure, bradycardia, signs of irritation and perhaps convulsions on the diseased side, and symptoms of paralysis on the opposite side, and if renewed attacks of these symptoms are observed. The author proposes the following classification:

1. Pachymeningitis hemorrhagica interna essentialis seu genuina. (This can be diagnosed only by microscopic examination.)

2. Subdural traumatic hemorrhage.

3. Subdural hemorrhage in connection with a hemorrhagic diathesis.

4. Subdural hemorrhage in connection with inflammatory processes in the intracranium.

5. Subdural toxic hemorrhage (provoked by chemotoxic or bacteriotoxic causes). The author reports the histories of two patients. One patient died on account of a severe hemorrhage which caused a great pressure on the medulla oblongata, and the other, on account of a hemorrhage into the subdural space on incision of the dura.

In both patients the classic changes characteristic for pachymeningitis hemorrhagica interna were found, namely: inflammatory infiltration, granulation, pigmented layers, deposits of calcium and thick clots at the inner side of the dura. The hemorrhage was not caused by manipulation. In one patient the lumbar puncture had revealed blood, and in the second patient the macroscopic and microscopic examination showed that the hemorrhage did not occur through arrosion of a large vessel, but from granulations and capillaries of the dura. An exact localization of the hemorrhage can scarcely be made, but if localizating symptoms are present, a decompression might save life.

AMBERG, Detroit.

MASKED MASTOIDITIS. ROBERT J. HUNTER, Arch. Pediat. **44**:205 (April) 1927.

The author calls attention to certain types of mastoiditis in infancy and childhood which are masked by symptoms arising in other parts of the body due to the toxemia of the aural infection. As examples, he cites cases of athrepsia and infantile diarrhea or cholera morbus, considered usually as feeding cases, presenting few, if any, symptoms referable to the ear, but in reality due to aural infection. The usual surgical treatment yielded good results.

Otitis media occurring in the course of a general respiratory infection is often the cause of most of the disturbance. The author mentions cases of the acute exanthems in childhood, patients suspected of having pulmonary tuberculosis, cases diagnosed as cerebrospinal syphilis because of involvement of the seventh and eighth nerves in the presence of severe headache and a four plus Wassermann reaction, cases of fractured skull, cases of general toxemia in which the concomitant mastoiditis had been overlooked and which cleared up under the proper surgical regimen. He emphasizes the necessity of a careful otologic examination.

CONNOR, St. Paul.

Pharynx

POSTOPERATIVE LEUKOCYTOSIS AND TEMPERATURE VARIATIONS FOLLOWING TONSILLECTOMY. J. A. FOOTE and MAURICE SELINGER, Am. J. Dis. Child. **33**:96 (Jan.) 1927.

The writings of various authors, Schultz in 1893, Busse in 1905, Krumbhaar in 1917, Stahl in 1921 and Witter in 1925, describe a postoperative leukocytosis after various surgical procedures, particularly gynecologic and abdominal. Witter also studied the postoperative temperature reaction in adults and found that it was asynchronous with the leukocytosis.

The authors studied the postoperative leukocytosis and rise in temperature in children subjected to tonsillectomy, dividing their material of 147 cases into four age groups. Group I consisted of children from 1 to 5 years of age; group II, those from 5 to 7; group III, those from 7 to 10 and group IV, those

from 10 to 13. Leukocyte estimations were made at two hour intervals, before and after operation, in children of various ages until eight hours had elapsed, and then at four hour intervals. The graphs of all these observations showed a rapidly increasing postoperative leukocytosis, reaching a maximum after from four to six hours, and remaining at that height for variable periods, depending on the age of the subject. The temperature was also taken, and both total leukocyte and differential counts of the blood were made before operation, from four to five hours after operation and twenty-four hours after operation.

A study of this material showed that the average rectal temperature before operation was 99.3 F.; five hours after operation it was 99.6; twenty-four hours after it was again 99.3. The data showed that the postoperative variation in temperature in the various age groups was slight and did not parallel the postoperative leukocytosis.

The maximum rise in leukocytosis was found to occur in from four to five hours after operation, regardless of age. The average leukocyte count before operation was 11,300; five hours after operation, 15,000; twenty-four hours after operation, 14,500. The leukocytosis occurring five hours after operation was definitely higher in children over 7 years of age than that occurring in children under 7. The latter group, however, showed a higher preoperative leukocytosis than children older than 7. The age groups under 7 showed a difference of less than 1,000 leukocytes in the counts made before operation and twenty-four hours after, while children from 7 to 13 showed a rise of over 4,000 cells in the same lapse of time. The leukocytosis occurring in the younger children showed a more rapid recession than that found in the groups of older children, the latter maintaining its level for a longer period of time.

In general, one may expect a leukocytosis of from 3,000 to 4,000 five hours after tonsillectomy. Leukocyte variations in the twenty-four hours following an operation have no demonstrable relation to temperature variation.

CONNOR, St. Paul.

PATHOLOGIC ANATOMY OF MALIGNANT TUMORS OF THE NASOPHARYNX. LUDWIG SINGER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:368 (Feb. 22) 1927.

Primary malignant tumors of the nasopharynx are rare. Round and spindle cell sarcomas are found comparatively seldom, lymphosarcomas more frequently. Most carcinomas are squamous epithelium tumors, frequently of the indefinite type. Trotter thinks that endothelioma is the most frequent type.

Among 7,051 necropsies in Muenchen-Schwabing, during the last ten years, only five cases of primary malignant tumors of the nasopharynx were found; one sarcoma, two carcinomas and two other tumors which could not be classified definitely. The disease took a rapid course in all cases, lasting from nine to ten months. In four cases the tumors seemed to originate from the lateral wall of the pharynx.

In one case the origin appeared to be at the base of the cranium, because the sphenoid and the posterior wall of the pharynx were destroyed, and because the lateral walls of the pharynx were less affected. The tumors had penetrated into the nasal cavities, especially into the ethmoid cells, and had involved the palate, nasopharynx, the base of the tongue, the retropharyngeal tissue of the neck on one side, the middle ear, the middle cranial fossa and the brain. In all instances the tumors followed the lymph vessels. In three cases distant metastases occurred. Metastases were found three times in the liver, once in the lung, once in the dura (with arrosion of the roof of the

cranium), once in the skin, in two cases in the lymph glands in the mediastinum, in the paratracheal region, in the hilum, in the region of the bifurcation, in the periportal and inguinal lymph glands. Twice an osteoplastic metastasis was found in the spinal column, the pelvis, the ribs and the bones of the extremities. The histologic observations of the tumors are given in detail. Concerning the differential diagnosis, the author mentions that Schminke considers that the lympho-epithelial tumors are epithelial new formations of a branchiogenous nature, a netlike syncytium of epithelial cells with lymphocytes in the retiform spaces. This picture corresponds with those found during the development of lympho-epithelial organs of the thymus and tonsils. These tumors are relatively benign, as they frequently recede after irradiation and are partly cured. Complicated processes of development take place in this region. Embryonic tissue layers persist to a great degree. This might explain why unripe tumors of an embryonic nature are found. Syphilis may be an auxiliary irritating factor. A chronic irritation might influence such embryonic germinal layers to assume a tumor-like growth, principally on the basis of a chronic inflammatory process with ulcerative cicatrized changes.

AMBERG, Detroit.

TONSILLECTOMY IN NEPHRITIS. F. W. TÖRNE, Acta oto-laryng. **10**:477, 1927.

The author has made a study of the relation between tonsillectomy and nephritis. He has a series of nephritic patients including several different types from whom the tonsils were removed, and a parallel series of nephritic patients whose tonsils were not removed.

The progress of the nephritic patients after tonsillectomy was followed by means of tests for albumin in the urine and the abnormal constituents in the sediment. The author investigated fifty-two cases of nephritis in which operation was performed. Practically all of the patients who showed albumin and abnormal constituents before operation showed a definite increase after operation. Most of them who were free from albumin and abnormal constituents in the sediment, showed one or both after operation. The average time of observation after operation was twenty-nine days for the acute, sixty-two days for the subacute and thirty-six days for the chronic conditions. The author says that during these observations, noticeable improvement was not observed.

The nonoperated series consisted of fifty-six patients treated in the same hospital. They seemed to progress as satisfactorily as the patients who were operated on.

The conclusion is that definite benefit has not been proved to follow tonsillectomy in subacute and chronic nephritis, and that the operation presents considerable risk as far as the course of the disease is concerned. The author admits that freedom from further infection of the throat is of great advantage and may overbalance the immediate disadvantage.

HILDING ANDERSON.

Larynx

THERAPY OF STENOSIS OF THE LARYNX CAUSED BY PARALYSIS OF THE MUSCULUS POSTICUS, WITH REPORT OF TWO CASES. AUREL RÉTHI, Ztschr. f. Hals-, Nasen- u. Ohrenh. **17**:355 (Feb. 22) 1927.

Bilateral paralysis of the musculus posticus causes a fixation of the vocal cords in the physiologic position of phonation. A series of operations have been proposed for this stenosis. These have not been successful. The author

reported his method of procedure in 1926. His first patient, a merchant, had been working for five years without discomfort. If the crico-arytenoid articulation is opened from the lumen of the larynx, the musculus transversus is found along the posterior border of the arytenoid cartilage. Along the anterior border is the musculus lateralis. Between them is the musculus posticus. The shortening caused by the shrinkage of the two adductors produces the fixation of the vocal cords in the median line. If the vocal cords must be freed from the fixed position, the two muscles must be severed and removed. The author performs the laryngofission and opens the crico-arytenoid articulation. He not only severs the two adductors, but removes them as radically as possible, so that a later reunion is entirely excluded. After laryngofission has been performed (under local anesthesia), a vertical downward incision is made in the upper third of the posteromedial side of the arytenoid cartilage. At the lower end of the arytenoid cartilage, the incision makes a sharp horizontal turn under the processus vocalis and the vocal cord. The cartilage is pulled upward with a fine hook and exposes the small capsule of the joint. In the median line, posteriorly, the strong posterior crico-arytenoid ligament is seen. If this is severed, the joint is opened. Then the cartilage is pulled upward farther and freed on both sides, anteriorly and posteriorly, with a fine knife. When the cartilage is pulled gently upward with the hook, the spider-web-like posterior capsule of the joint tears easily, so that the surface of the joint and the group of the muscles lie bare. At the medial side of the cartilage, the musculus transversus can be seen. It is grasped with a fine artery forceps and severed with the scissors. The posterior mucous membrane must not be injured. This can easily be avoided, because the muscle fibers can be readily separated from the mucous membrane. The whole medial border of the cartilage must be freed from muscle fibers. In front, the musculus lateralis, and above it, the musculus thyro-arytenoideus, are visible. The anterior margin of the joint is freed from these muscle fibers with a fine scalpel. As much of the muscle tissue as possible is removed. Adhesions are thus prevented, and the vocal cord sinks into a recess. Care must be taken that the musculus posticus is not injured, because it fixes the arytenoid cartilage in a lateral direction. In order to obtain a complete result, the mucous membrane below the vocal cord should be removed for a width of from 3 to 5 mm. The incision behind the arytenoid cartilage is closed with two catgut sutures and the wound below the vocal cord with two stitches. The lumen of the larynx is packed with a Mikulicz tampon for from two to three days. Before the wound made by laryngofission is allowed to heal, the vocal cord, which has not been operated on, must be examined for traumatic irritation. If an edematous swelling has occurred, it is lanced with the scissors. The result of the operation is a complete reestablishment of the air passage. The operation must be performed only on one side, because there is sufficient space between the vocal cord which has been operated on and the vocal cord which has not been operated on to admit the amount of air required normally.

The author cites the history of two patients who were recently operated on successfully according to his method. The first patient, a man, aged 56, had had tuberculosis of the lungs. Following an attack of acute tonsillitis, the process in the lung became active and an exudate developed in the mediastinum. Pressure on both recurrent nerves caused a bilateral paralysis of the musculus posticus. Ten months after an emergency tracheotomy, the patient was operated on according to the method of the author. One year and a half later, the side operated on was in good condition. The right vocal

cord, which was fixed in the middle line, went toward the left, after four months, so that the shrunken adductors were found to be innervated and were functioning. The voice of the patient became strong, and he continued his lectures as teacher at the university. The other patient, a man, aged 24, a metal worker, had been operated on for a deep-seated goiter. After the operation, his breathing became worse. His voice became weak and rough. Later, his voice improved, but his breathing did not. He could scarcely work. He also suffered from an apical catarrh on the right side. Under local anesthesia, the patient was operated on after the method of the author, on the right side. Four weeks after the operation he was able to work full time. The voice became strong, and breathing was normal. The vocal cord that was operated on remained fixed in a maximal lateral position, whereas the left cord functioned over the middle line. Phonetic treatment improved the action of the left vocal cord. Without doubt, the operation results in a satisfactory width of the glottis, and, in some cases, a function of the vocal cords which approaches normal.

AMBERG, Detroit.

Nose

CONGENITAL ATRESIA OF THE ESOPHAGUS. H. R. LITCHFIELD, Arch. Pediat. **44**:310 (May) 1927.

The author reports a case of congenital atresia of the esophagus, and in the discussion brings out the fact that this lesion is one of the commoner ones seen in the new-born. Such atresias are apt to be found in the esophagus, the duodenum and the rectum, the latter receiving more attention because they are more amenable to surgical treatment. Atresia of the esophagus may take the form of complete absence, the organ being represented by a muscular band stretching from the pharynx to the cardiac end of the stomach; the esophagus may terminate in a simple culdesac, with or without a communication from its lower end to the trachea or bronchi; there may be a membranous obstruction of the esophagus. The author gives as diagnostic signs the immediate regurgitation of all food given by mouth, constant salivation and attacks of asphyxia and cyanosis following the ingestion of food. Bronchopneumonia is the usual terminal complication.

CONNOR, St. Paul.

MUCOCELE OF THE FRONTAL SINUS, WITH THE REPORT OF A CASE. W. T. GARRETSON, Laryngoscope **37**:350 (May) 1927.

Garretson goes into the literature somewhat, giving the clinical and the classic picture, the etiology and pathology, symptoms, clinical diagnosis and duration of mucocele of the frontal sinus. He reports a case of his own in a patient, aged 33, who was first seen in July, 1923, complaining of protrusion of the left eye with double vision of seven years' duration. During that time, a gradual protrusion of the left eyeball with a tendency of the eyeball to turn downward and outward had been noted. There was never any pain, headache or nasal obstruction, but colds had been frequent.

Examination showed marked protrusion of the left eye downward, outward and forward, with normal movements in all directions. On palpation of the upper part of the orbit, a definite tumor mass was felt, fluctuant and projecting from the roof of the inner side of the orbit. The bony floor of the frontal sinus had been absorbed. The vision in the left eye was 6/60, and the ophthal-

moscopic examination showed considerable optic atrophy with marked engorgement and tortuosity of the retinal veins. The roentgenogram showed an indefinite crescent shaped shadow in the upper and inner portion of the orbit. The rest of the remaining examination did not reveal any abnormality.

A diagnosis of mucocele of the left frontal sinus was made, and a modified Killian operation was performed a few months after the patient was first seen. The operative examination showed a large mucocele completely filling the frontal sinus and fully one third of the orbital cavity. This mucocele was entirely subperiosteal as far as orbital content was concerned. The roof of the frontal sinus was absorbed and the dura of the anterior fossa was exposed.

The floor of the frontal sinus was completely destroyed. The anterior chamber cells were normal but were considerably compressed. The os planum was bulging inward. At the time of the operation, the os planum and ethmoid cells were leveled off to the level of the bony floor of the middle fossa. The middle turbinate and part of the nasal process of the superior maxilla were likewise removed. No attempt was made to remove the mucous membrane from the lining of the frontal sinus and the orbital projection. The patient was seen eleven days after discharge from the hospital, and the proptosis had entirely disappeared.

One and one-half years later, the patient returned, and an examination showed a slight suggestion of ptosis in the left eye. Excursions of the eye were normal in all directions. There was no evidence of diplopia. Examination of the left fundus showed slight atrophy, but previous venous engorgement was not found. The vision was 6/30 and was improved with lenses. The patient did not have any unusual discharge and breathed freely through the nose. The cannula of the frontal sinus entered the region of the frontal sinus freely.

VAIL, Cincinnati.

Miscellaneous

ROENTGENOGRAMS OF SWALLOWED DENTAL PROTHESES. THIELEMANN, Ztschr. f. Hals- Nasen- u. Ohrenh. **17**:351 (Feb. 22) 1927.

It is reported in the literature that even large dental protheses cannot be shown in roentgenograms. Protheses made of metal show best; those made of caoutchouc are almost as good, but those made of hekolit cannot be seen. If there are only a few teeth in the hekolit prothesis little or nothing may be seen in the roentgenogram, on account of the thick shadows of the organs in the chest. Celluloid consists of carbon, oxygen and hydrogen, which are elements of low atomic weight with little power of absorption. Caoutchouc contains sulphur, an element of high atomic weight. If a hard irradiation is used, a prothesis made of caoutchouc should always show in the roentgenogram.

AMBERG, Detroit.

POLYARTHRITIS AFTER EXENTERATION OF THE BULB IN A CASE OF GONORRHEAL CONJUNCTIVITIS. H. U. MØLLER, Hospitalstid. **70**:137, 1927.

The author reports a case of acute gonorrheal conjunctivitis and urethritis occurring in a man, aged 23.

The cornea was generally cloudy on admission to the hospital, but was not ulcerated. An injection of 5 cc. of milk was given on the first day. Mild silver protein, 10 per cent, and frequent irrigations were used in the conjunctival sac.

On the second day the cornea showed ulceration, and no more milk injections were given. The cornea perforated some days later. As the eye became steadily worse, it was finally decided to do an exenteration of the bulb. This was done eighteen days after admission.

Two days after the operation there was marked local swelling and pain, tenderness and swelling of the left knee and a number of other joints in the lower extremities. The patient recovered under a treatment including injections of milk.

Several interesting points are brought out by the author: 1. The first milk injection seemed to have a deleterious effect on the cornea. 2. An acute polyarthritis promptly followed the operation on the acutely inflamed eye. He concludes that the operation disseminated the bacteria into the blood stream. 3. The arthritis improved greatly after milk injections.

ON THE TREATMENT OF CONGENITAL CLEFT PALATE. H. BAGGER, Acta oto-laryng. **10**:361, 1927.

The author, the chief of the Jutland Clinic for Cleft Palate, goes into a discussion of the history of surgical and prothetic treatment of cleft palate. He summarizes the results in various operative procedures as reported by different authors. At the Jutland Clinic a method of treatment is used which was elaborated by Prof. Ernest Warming, and which consists in speech training. This is combined with the use of a prothesis which has been designed at the clinic. He reports good results in this combined treatment, and prefers it to operation, except for infants.

THE FUNCTION OF THE TONSILS. VIGGO SCHMIDT, Acta oto-laryng. **10**:486, 1927.

The author cites a number of old theories concerning the function of the tonsils: that they play some part in digestion (1880), that they secrete a lubricant (Bosworth—1889); that they are pathologic components of the throat; that they aid glycolytic fermentation in the saliva, and that they are regional lymph nodes (1895-1920). He quotes finally Schlemmer's hypothesis (1923): "The lymphatic tissue forms an integrant part of the pharyngeal tissue without any separate function."

He has a new theory to propound, based on the immunizing properties of leukocytes. K. A. Heiberg's studies have shown that the germinal centers in the tonsils destroy lymphocytes instead of producing them. He supposes that the lymphocytes when destroyed liberate endolysins as do the polymorphonuclear leukocytes in an inflammatory process. Thus an antitoxin may be produced at the portal of entry of most infections into the body.

Very small inflammatory changes in the tonsils produce marked leukocytosis. This is merely a mobilization of leukocytes from depots through the process of positive chemotaxis. The author suggests that the tonsils may exert a marked influence of the mobilization of leukocytes.

He performed eighteen experiments on persons having normal tonsils, which consisted simply in massaging the tonsils and making a series of blood counts immediately before and after the massage. All eighteen showed a marked leukopenia beginning five or ten minutes after the massage and reaching its maximum in from twenty to twenty-five minutes. This reduction was largely due to decrease in lymphocytes.

Twelve control experiments carried out on tonsillectomized persons failed to show any change in the leukocyte count.

He concludes from these experiments that a lymphocyte antitoxin is produced in the germinal centers, which, as a result of the massage, enters the blood stream in larger quantities than is normally the case, thus producing the observed lymphopenia.

He performed six experiments on persons suffering from chronic tonsillitis. Some of these showed a marked leukocytosis (due to increase in polymorphonuclears) beginning almost immediately (fifteen minutes to an hour). The experiments were stopped because two of the six persons developed rheumatic fever within twenty-four hours.

He quotes K. A. Heiberg on the microscopic changes in chronic tonsillitis. The principal changes is a destruction of the germinal centers with a loss of contained phagocytes and an accumulation of surrounding lymphocytes.

ANDERSON, Duluth, Minn.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Monthly Meeting, March 7, 1927

ARTHUR M. CORWIN, M.D., *President, in the Chair*

VACUUM FRONTAL HEADACHE. Presented by DR. JOHN A. CAVANAUGH.

History.—A girl, aged 19, consulted me because of pain over the left eye, which began two days before; it had come on gradually, and when the head was moved quickly pain became sharp. It had been severe the previous day, and the left side of her nose felt stopped up. She had used a spray of epinephrine, which had given her some relief. There was no discharge from the nose; when she moved her eyes from side to side or up or down, the pain increased. The left side of the head felt heavy.

Examination.—The teeth appeared normal. Her tonsils had been partially removed; the remaining portions appeared normal. There were large follicles over the pharyngeal wall and some remains of adenoid tissue.

On the right side of the nose there was marked deviation of the septum to the right, with a ridge in contact with the inferior turbinate. There was a spur far back in contact with the lateral wall. A small ulcerated area half the size of a ten cent piece was found in Rossenbach's area.

On the left side of the nose there was a large open cavity due to the deflection to the right. The middle turbinate hugged the lateral wall; no secretion was apparent. The middle turbinate shrank readily from the lateral wall. Suction was applied, but no secretion appeared. She was relieved after the use of epinephrine and cocaine. Marked tenderness was revealed by tapping the left frontal region. Marked tenderness was shown also by pressure on the inner side of the roof of the orbit and on the floor of the frontal sinus. The eyes appeared normal. The temperature was normal. Roentgen-ray examination by Dr. Hubeny gave negative results.

The following day the patient returned with the same symptoms, but she had slept well. I then introduced a cannula into the left frontal sinus. As the cannula entered, I heard a low blowing sound, and the patient asked, "What is that sound? I feel better."

She has had no further discomfort, but said that for about twenty-four hours it hurt to move the eyes. Ewing's sign was typical in this patient.

MENINGITIS FOLLOWING ACUTE SUPPURATIVE OTITIS MEDIA. Presented by DR. CAVANAUGH.

History.—A white man, aged 48, a boilermaker, presented himself at my office Oct. 29, 1926, stating that three weeks before he had had a cold in the head, followed by pain in the left ear. He had walked the floor for seventy-two hours before the abscess broke in the left ear; then he obtained relief. He had a swaying feeling from side to side, but no vertigo; there was a ringing and pulsating sound, and pain in the back of the head on the left side where the muscles are attached to the head. He felt weak and perspired a great deal at night. The hearing was impaired in the left ear. There was no nausea or vomiting.

Examination.—Examination of the nose, mouth, nasopharynx and sinuses showed nothing unusual. The tonsils had been removed four years previously.

The drum of the right ear was markedly glazed.

Landmarks were obscure in the membrana tympani of the left ear. The membrane was red, and there was bulging of the posterior superior quadrant and perforation in the anterior inferior quadrant.

Tenderness was evident on deep pressure at the junction of the sternocleido mastoid and at the posterior portion of the mastoid process. Edema was not present. The temperature was 98 F., and the pulse rate was 82.

An audiometer showed 77 per cent loss of hearing in the left ear, and 41 per cent in the right ear. The Weber reaction was positive to the left. The Rinne reaction was positive in the right, and negative in the left. Small *a* was heard by air conduction 54 seconds, and by bone conduction 24 seconds in the right ear; by air conduction 10 seconds and by bone conduction 32 seconds in the left. The voice was heard at a distance of five feet in the right ear; one half a foot in the left. Results of the Galton whistle test were: 4.225 in the right ear, 6.125 in the left. There was no nystagmus. The Romberg symptom was not present. There was no past pointing. A roentgenogram showed that both mastoids were of the apneumatic type, with more density over the left side. A blood count showed: white cells, 18,000.

Operation and Course.—An operation was performed on the left mastoid on Nov. 1, 1926, with the use of the burr. The mastoid process was sclerotic, with no cells in any part. The middle cranial fossae were low; granulations and pus were present in the antrum. An area the size of a dime was exposed in the dura of the middle fossae. The lateral sinus was exposed for about 1 inch (2.5 cm.); the dura in both areas appeared normal; the usual dressings were applied; a culture from pus in the antrum showed no growth after twenty-eight hours; the growth resembled the proteus type of bacilli; the patient progressed satisfactorily. The temperature ranged from 98 to 99 F., and the pulse rate was from 72 to 86.

On Nov. 12, 1926, the patient complained of general headache which was relieved by acetylsalicylic acid and amidopyrine, U. S. P., and he left the hospital on November 14. Afterward he called at the office for dressings and progressed until November 24, when he reported that he had pain around the left ear and eye and seemed to sway from side to side. No nystagmus or past pointing was present; the Romberg test gave negative results, and the tuning fork lateralized to the left. He seemed to be progressing well until November 29, at which time he called at the office, saying that the ear felt better, but that he had been nervous during the night and had a feeling of tightness in the chest and occasional sharp shooting pains through the lungs. He was perspiring and looked anxious. His temperature was 101 F.; pulse rate, 110; respirations, 26. I sent him to St. Luke's Hospital, where Dr. Lawrence Mayers examined him. His observations were as follows:

Physical examination of the head showed no signs of anesthesia, paresthesia or palsy. No weakness of the muscles of expression was evident. There was no hyperesthesia over the region of the mastoid.

There was tenderness on deep pressure of the muscles of the neck on the right side. The head could be moved backward and forward with but slight discomfort. Lateral movement elicited pain only on the right side. There was no swelling about the neck.

The pupils were dilated equally and reacted equally to light and accommodation. The mouth and chest were normal. The rhythm of the heart was normal, and the pulse rate was 84.

The abdomen was normal. Palpation or percussion revealed no enlargement of the spleen or tenderness in that region.

Reaction to the Kernig sign was negative. There was no increase in the pain when the legs were brought well up on the chest. Both the deep and the superficial reflexes were present and active.

The patient was seen on the following day, and the picture remained about the same. The temperature was normal, and remained normal throughout the day. The pulse ranged from 82 to 60. He had a good night and was taking plenty of nourishment and liquids.

The blood count taken on Nov. 29, 1926, showed 18,700 white cells; hemoglobin, 70 per cent; large lymphocytes, 2 per cent; small lymphocytes, 6 per cent; transitional cells, 1 per cent, and polymorphonuclear neutrophils, 91 per cent. That evening the patient complained of pain in the back of his head and in the muscles of the left side of the neck. The temperature was 99.8 F.; the pulse rate, 80 and respiration, 20.

On November 30, he still complained of pain in the head and vomiting, which was not projectile. The temperature ranged between 97 and 98 F.; the pulse rate was from 60 to 84, and the respirations ranged from 22 to 28. Dr. Frank Brawley examined the eyes, and reported the reaction of the fundi and pupils normal.

On December 1, the temperature ranged between 97 and 98.2 F.; the pulse rate was from 44 to 64, and respirations ranged from 20 to 28. At 3 a. m. the patient was nauseated; at 4 a. m. he vomited a greenish-yellow fluid and complained of pain and stiffness in the neck which radiated to the right and left side; he said that otherwise he felt good. The nurse thought him irrational at times during the night. When I called, his mind seemed clear, but he could not hear in either ear; when the tests were made with the tuning forks, he could not hear. There was no spontaneous nystagmus in any position of the eyes and no past pointing; the pupils were equal, and the Kernig reaction was negative. There was a great deal of pain on the right side of the neck, relieved only by opiates. A blood count showed 22,400 white cells.

At 1 a. m., on December 2, the patient felt nauseated, but did not vomit. He complained of severe pain in the right side of the head. After taking one-eightieth grain of morphine (0.008 Gm.), he slept for an hour. At 5 a. m. the temperature was 98.8 F.; the pulse rate was 48 and respirations were 24. Pains occurred spasmodically. At 8:30 a. m., when I saw him, he said he was feeling better, but was totally deaf in both ears. While the nurse was giving him the usual morning care he became blue and unconscious, the pulse rate went to 160, the temperature to 104 F., and respirations to 32. He died in a few minutes.

Necropsy.—The following is the necropsy report of Dr. Edwin F. Hirsch, pathologist at St. Luke's Hospital: The spinal fluid was faintly turbid. The right middle cranial fossa was covered with a layer of fibrin. There was a thick yellow exudate on the inferior surface of the right temporal lobe, corresponding to the middle cranial fossa, and also a thick exudate on the superior surface of the right cerebellar hemisphere. It had a foul-smelling odor. The right sigmond sinus was filled with a soft, necrotic yellow-gray to red thrombus that extended about 2 cm. into the right lateral sinus of the dura. There was a slight hyperemia of the dura, covering the left middle cranial fossa. When this was removed there was a necrosis of the bone tissue and a hole 1 by 0.8 cm. through the anterior surface of the petrous portion of the temporal bone near the base, into the middle ear. There was an exudate

of the dura covering the hypophysis. There were no changes in the sphenoid, ethmoid and frontal sinuses of the cranium.

The brain hardened in a solution of formaldehyde, with the top half of the dura attached, weighed 1,444.5 Gm. on Feb. 24, 1926, and with the top half of the dura removed it weighed 1,414.5 Gm.

The cerebral hemispheres were symmetrical. They measured 18 by 7 cm. and were about 11 cm. high, measured in the temporal region. The convolutions were markedly flattened; the sulci were narrow. There was a moderate opacity of the leptomeninges, especially on the left side, less so on the right. There were no gross deformities. On the inferior surface of the right temporal lobe involving the posterior half approximately, there was a thick yellow exudate that extended entirely to the midline in the region of the mammillary bodies. There was a slight turbidity of the leptomeninges on the left side covering the pons. In the exudate covering the inferior surface of the right temporal lobe, there were punctate hemorrhages and hemorrhages as large as 1 cm. that involved altogether about 20 per cent of the surfaces. The vessels at the base of the brain, including the basilar, vertebral, posterior cerebral, middle cerebral and anterior cerebral, were normally thin-walled. The diameter of the basilar artery was about 3 mm. The cerebrum was cut away from the other structures at the level of its peduncles, and the superior surface of the right cerebellar hemisphere was covered with a thick, yellow exudate. On the left side there was only a little exudate, involving perhaps 15 per cent of the surface. In the region of the tonsilla there was a marked Foramen magnum pressure furrow.

The diameter of the aqueduct of Sylvius, measured at the front of the fourth ventricle, was 2 mm., and it was almost round. There was no obstruction in the region of the posterior vellum and anterior vellum of the fourth ventricle. The floor of the fourth ventricle was not widened. Its length was 3 cm.; the distance to the roof was 0.8 cm., and to its lateral recess was 0.9 cm. from the midline. There were no hemorrhages in the white substance nor in the dentate nuclei. There were no hemorrhages in the brachium pontis, resiform body or brachium conjunctivum on both sides, or on surfaces made by making numerous transverse sections through the pons and upper part of the stem of the brain. Thin frontal sections 1 cm. apart were made of the cerebral hemispheres. There were no hemorrhages in the basal ganglions or white substance, and if there was any widening of the ventricles it was slight. Along the intercerebral fissure, especially on the right side, there was an exudate. There were no regions of softening. The lining of the ventricles was smooth, and there were no gross changes in the choroid plexus.

Microscopic Examination.—Tissues for histologic examination were taken from the right and the left temporal lobes, the right and left frontal lobes, the right and left occipital lobes, the superior surface of the left and the right cerebellar hemispheres, the right and left basal ganglions and the choroid plexus. These sections were stained with hematoxylin and eosin, phosphotungstic-acid hematoxylin, polychrome methylene-blue and eosin and aniline blue. On the inferior surface of the left occipital lobe there was a huge exudate in the meninges that contained dense masses of polymorphonuclear leukocytes, mononuclear cells, fibrin and recent hemorrhages. In the right occipital region there was chiefly edema of the meninges. This was the case also in the right frontal, left frontal, right temporal and left temporal regions, but on the superior surface of both cerebellar hemispheres there was a large exudate like that already mentioned. In none of the sections of the brain

substance were there noteworthy changes. In the choroid plexus there were many concentric hyaline structures (psammoma bodies).

The diagnosis was acute suppurative leptomeningitis. The spinal fluid was almost clear, faintly yellow. Direct stain (Gram) showed no bacteria in aerobic cultures on blood agar; a few pin-point-sized colonies appeared in about seventy-two hours, which stained as gram-positive staphylococcus. Growth did not occur in anaerobic cultures in ninety-six hours in three trials.

Staphylococcus pyogenes-albus in pure culture was found in the spinal fluid and in the exudate.

CLONIC SPASM OF THE SOFT PALATE. Presented by DR. CHARLES LONG.

A woman, aged 46, of neurotic temperament, had a radical antrum operation for chronic maximillary sinusitis in November, 1926. A short time thereafter she developed an adenoid voice, inability to breathe through the nose, headaches, insomnia and suffocative attacks. At this time the antrum was free from infection, and no nasal discharges were present; the soft palate was so fixed to the nasopharynx by spasm that it could be separated only after cocainizing and massaging with a rubber tube.

SIMULTANEOUS CANCER AND PRECANCEROUS LESIONS. Presented by DR. GEORGE W. BOOT.

A man, aged 65, who had worked as a roofer, using tar, for two years, had an epithelioma on the right side of the nose and on the lower lip, where his pipe rested; spots of hyperkeratosis on the right hand and on the right cheek, leukoplakia of the tongue and of the mucous membrane of the right cheek. I believe that these four precancerous lesions and two definite cancers were due to working in tar.

The case was remarkable because two cancers and four precancerous lesions developed simultaneously.

FOREIGN BODIES. Presented by DR. JOSEPH C. BECK.

Two cases of foreign bodies came to my notice within two weeks. The first case was that of a child who was wearing a double ring used to prevent thumbsucking. In the child's efforts to get the ring off, it dropped into the pharynx. A general physician removed the ring with a curved forceps by sense of touch. Considerable superficial reaction was induced, and the child was brought to me for advice. I think that the apparatus should be improved or its use discontinued.

The second case is of interest from the medicolegal standpoint, and I should like to have it put on record so that it could be used for reference, if necessary, by physicians called to testify in similar cases.

The patient was a child who had a suppurating nose and was taken to a rhinologist, who diagnosed the condition as diseased tonsils and adenoids and advised operation. The suppuration did not cease after the operation. From the description given to me, it appeared that the child was not thoroughly reexamined at that time. Another otolaryngologist was consulted, and he made an examination and a roentgenogram. His diagnosis was unilateral sinus disease, and he advised operation under the lip. Then they consulted me. During the examination a small wooden collar button was discovered in the nose and removed.

It is easy to overlook such a foreign body when it is located under the inferior turbinate body. The roentgenogram did not show it, and the specialist was entitled to his diagnosis of sinus disease.

DISCUSSION

DR. J. HOLINGER: I should like to ask whether Dr. Cavanaugh's patient had an abscess of the brain prior to the development of meningitis.

DR. CAVANAUGH: He did not.

DR. HOLINGER: I should like to call attention to a recent publication of Dr. Schlittler of the clinic in Basel, who cut in serial sections several temporal bones from patients who had died of meningitis after acute otitis.

Schlittler found that in two cases there were epidermization and cholesteatomatous masses in the attic of the middle ear, although there was nothing in the history and nothing in the examination in vivo to indicate this. Was anything of this kind discovered in Dr. Cavanaugh's case? In all cases in which meningitis develops following an acute otitis, the attic should be examined with great care. I believe that if this were done a similar condition would be found in many instances, and would clear up many doubtful cases.

DR. A. H. ANDREWS: From the cases of meningitis I have seen following the recent epidemic, I believe one should be especially on guard for unexpected conditions. Did the odor come from within the cranial cavity or within the brain, rather than from the mastoid? I am inclined to think there was a small abscess of the brain which had become infected from the mastoid, even though this was not discovered at necropsy.

DR. ROBERT GOOD: How large were the frontal sinuses in Dr. Cavanaugh's case of vacuum frontal sinus? My experience has shown that they are usually large.

DR. AUSTIN A. HAYDEN: I should like to ask Dr. Beck how he discovered the button under the inferior turbinate body. I think one of the most important things in the determination of the presence of a foreign body in a child's nose is to place the child under a general anesthetic, to eliminate struggling, and to allow the surgeon a fair chance to make an examination. I should like to know where the silver finger-cot was found in the other case.

DR. BECK: I did not find it necessary to put the child to sleep, and it allowed me to do anything I wished. A capillary tube was inserted in the nostril to remove all the mucus and secretion, and I could then see the foreign body. With a delicate forceps, such as is used for removing foreign bodies from the ear, the button was grasped and removed without any trauma.

The silver ring was located by the history which was given me, for I did not see the child until after its removal. The physician said it was located in the hypopharynx.

I recall a case similar to the one reported by Dr. Cavanaugh in which *Bacillus subtilis* was found at necropsy. How this got into the brain no one knew, but Dr. Hektoen made the diagnosis. There was no abscess, but a superficial malodorous collection, such as occurred in Dr. Cavanaugh's case. Possibly they did not find any gross breaking down of bone over the attic, but it is customary in necropsies always to uncap the attic to see if anything is there. I think that there were not sufficient reports on the otolaryngologic observations post mortem.

Important work is now being done at the University of Illinois under the direction of Dr. Pierce, showing that odors are due to various types of spirochetes, such as those found in abscesses of the lung.

DR. CAVANAUGH: The ear and attic were both exposed thoroughly, and no cholesteatoma was found. Most of the exudate was found on the right side, while it was the left on which operation was performed. It was thought that

the exudate could be traced from the area of the middle ear across the pituitary body to the right side. No spirochetes of any type were found. There was a small perforation through the tegmen from the middle ear.

In the case of the vacuum frontal sinus, the cavity was rather small, or of normal size.

PROBLEMS IN BRONCHOSCOPY AND ESOPHAGOSCOPY. Presented by DR. BOOT.

Indications for bronchoscopy and esophagoscopy were discussed. He described the conditions under which bronchoscopy should be performed at once and those under which one may wait for proper preparation, and the indications for upper and lower bronchoscopy. Other topics included were: anesthesia in bronchoscopy, the duration of the operation, the types of instruments used, the dislocation of a foreign body lodged in the hypopharynx or upper esophagus, the difficulty of locating a foreign body lodged at the suprasternal notch and the methods of removing foreign bodies when the cervical vertebrae are anklyosed.

RADIO TRANSLUCENT FOREIGN MATERIAL IN THE LARYNGOTRACHEOBRONCHIAL TREE. Presented by DR. EDWIN MCGINNIS.

The word "radiotranslucent" is used in the sense that the light rays of the roentgen-ray machine pass through the objects without sensitizing the plate; that is, without casting the shadow that would make the obstructing object visible in roentgenogram.

Cases have been known in which persons have inhaled foreign material, and the diagnosis and removal have been delayed because the roentgenogram of the neck and chest did not reveal the object. In taking a complete history, the accident is usually noted and should not be forgotten, because this is an aid in addition to the physical observations in the handling of the case.

Several illustrative cases are included in the paper.

DISCUSSION

DR. CORWIN: I recall a patient seen before the days of bronchoscopy. A healthy woman was having difficulty in upper respiratory breathing, with signs of bronchitis and emphysema. A Schroetter tube was passed well down into the trachea, but it gave no relief. A low tracheotomy was then performed, but did not give relief, and the patient died immediately. At necropsy three or four polypi were found attached to the tracheal wall, beginning 2 inches (5 cm.) below the place of the tracheotomy. One was almost as large as the tracheal lumen, hanging down and obstructing the passage of air both ways, notably in expiration. A bronchoscope would have made diagnosis and cure possible, but the roentgen ray would have shown nothing.

DR. SAMUEL SALINGER: I think that the obstruction caused by the anterior bulge of the cervical spine, as mentioned by Dr. Boot, could be overcome by avoiding too much extension of the head and at the same time flexing the spine.

After foreign bodies in the esophagus have passed the episternal notch, they will usually pass on into the stomach. This is generally true, although exceptions are not uncommon. A case in point is that of a woman who swallowed a chicken bone, which the roentgenogram showed at the level of the episternal notch. Search for it revealed that it had disappeared from that point and was wedged across the esophagus just above the cardia.

Referring to Dr. McGinnis' paper, I should like to report a case seen recently in a child who had swallowed a coat button. There was retching and vomiting, but a roentgenogram failed to show even the slightest shadow. The following morning an esophagoscope was passed, and a button was found in the usual place, which on removal and examination proved to be made of wood.

DR. GOOD: I think Dr. Boot has exaggerated the strain a patient undergoes in having a bronchoscopic examination. Dr. Chevalier Jackson frequently gives no anesthetic and makes the bronchoscopic examination in a few moments. I think a great deal depends on the position of the head during the procedure. I have found that by lifting the head up and passing the pharyngoscope down until I can see the trachea and then passing on, there is not much strain. I use scopolamine and morphine in all my cases, and it assists greatly in relieving the strain and worry of the patient.

I consider that Dr. Boot's point in regard to foreign bodies in the esophagus passing the upper stricture is important. If foreign bodies do this, one need not worry much about their not passing into the stomach. I had a patient who swallowed an oyster shell. In the effort to dislodge the shell it passed on into the stomach, and was excreted in many pieces, because it was broken up by the hydrochloric acid. In several instances patients have passed open safety pins within a few days.

I do not agree with Dr. Boot as to the ease of performing tracheotomy, nor I do agree that it does not add to the risk of the bronchoscopy. I believe it adds to the shock and clouds the field when one is trying to see foreign bodies in the bronchi, on account of some blood in the trachea. In my opinion, tracheotomy is seldom necessary in these cases. I know of a case in which a physician used a toothpick wrapped with cotton to put medicine in his nose. He lost hold of the toothpick, inhaled it, and it passed into the lung. As a rule, a foreign body in the lung, no matter how small, will produce moist râles, but this cotton-covered toothpick did not cause such symptoms. It was located by means of a bronchoscope, and as I was about to remove it, the patient coughed it out with such force that it flew halfway across the operating room. I believe a bronchoscopist should be called at once in every case of foreign body obstruction.

DR. HAYDEN: I think there are many exceptions to the remark of Dr. Boot in regard to not worrying about foreign bodies after they pass the suprasternal notch, particularly those with sharp edges. I recall a case that I saw several years ago, that of a woman who swallowed a piece of glass while eating bread and butter and jelly. When she was brought to the hospital she was already moribund, with acute mediastinitis, and she died shortly. Necropsy showed that that a perforation had occurred from the esophagus into the mediastinum. The fact that most foreign bodies do pass down substantiates the statement of Dr. Boot.

A sword swallower in a circus side-show once told me there were only about half a dozen sword swallowers of recognized standing in the United States, and that they were all of the same family. This woman had been taught the art by her uncle, whose death occurred in an unusual way. He lived in New York, and a surgeon there asked permission to pass an esophagoscope. Consent was given, but in some way the patient suffered a perforation of the esophagus during the procedure, and died.

Regarding opaque foreign bodies that are breathed into the larynx, I saw an interesting case of this type in Chevalier Jackson's clinic, in a physician's

child, 4 or 5 years old, who was suspected of having pharyngeal diphtheria. The child's father attempted to make a culture of the throat with an ordinary applicator wrapped with cotton. During the manipulation the applicator broke off, and the distal end was lost. A considerable amount of dyspea immediately resulted. The staff was recovered from the left bronchus about thirty-six hours later.

Regarding lower bronchoscopy, I am in accord with what Dr. Good said, and I believe that it is hardly ever of advantage over the upper route. He thought the greatest number of cases that require a bronchoscopy or direct laryngeal examination are found in the children with symptoms of old-fashioned croup, with the typical crowing, whistling sound in the larynx. The laity is becoming so well educated regarding this that if they hear such a sound, especially if anything the child has been playing with is missing, they suspect that a foreign body is lodged in the respiratory tract. A diagnostic bronchoscopy, in these cases will often reveal the true cause of the trouble. Every otolaryngologist should be prepared to make the diagnosis direct laryngoscopy.

Dr. Andrews: I am convinced of the importance of these cases and of the necessity of the operator being a man of much experience and good judgment. Life is too short and human capabilities too limited for all to become proficient in this line, and those who specialize in the work should be allowed to do it.

A high school girl consulted me because of a constant pain in the throat which proved to be due to a steel pin. While I was getting the instruments ready to remove it, it passed through the larynx into the lung. A roentgenogram showed its position in the lung. I tried to get the young girl's parents to take her to some one who specialized in this work, but they declined. About six months later this steel pin with a glass head was coughed up, point foremost, although the roentgenogram showed that it went down head foremost. It was not much encrusted.

Dr. Charles H. Long: Some years ago I saw a child, aged 5, suffering from dyspnea. The history revealed that the child had been playing with some buttons and that one was missing. The family physician was unable to find the button. Several months later bronchitis developed. Then shortness of breath and marked dyspnea occurred. A surgeon was summoned, who performed a median tracheotomy, inserted a trachectomy tube and advised a trip to Chicago. I examined the child at the postgraduate hospital. The patient was wearing the tracheotomy tube with comfort, with the exception of a constant hacking cough, accompanied by much mucopurulent secretion which contained many black particles that had been considered coal dust. Whenever the tube was removed for cleansing, the dyspnea was so intense that suffocation was greatly feared. Pockets having formed about the wound, it was often reinserted with difficulty. A roentgenogram was ordered, and an appointment was made for a bronchoscopic examination. At the appointed time for the operation, the patient was anesthetized; the roentgenogram was found to be worthless, as it had been taken too low down. The bronchoscope was inserted into the trachea. As it reached the third tracheal ring, a metallic click sounded. The late Professor John Fletcher, who was assisting, suggested examining the area where the noise was heard. A red, congested ring on the posterior tracheal wall was observed, with a bright shiny-looking body appearing in the center. Unsuccessful attempts were made to extract it with forceps. After enlarging the hole, a button with a metallic outer ring about a core

of hard rubber composition, was removed. The deterioration of this rubber core accounted for the black particles expectorated by coughing.

We decided that this button, which had been lost, had passed into the esophagus and had been caught in a fold of the mucous membrane and retained for about eighteen months. It was gradually forcing its way into the trachea. Its presence had created the disturbance which had threatened to terminate the patient's life.

DR. BECK: Several years ago, the late Dr. Ballenger and I went to Philadelphia to learn bronchoscopy from Dr. Jackson. I immediately got a set of Bruning instruments, but soon found that Dr. Friedman was much more proficient in the work than I, so I referred my patients to him. I have always felt that this is a limited field and that the physicians who perfect themselves in it should be given the work to do.

I do not consider tracheotomy necessary in a great many instances, but I think the man doing the work is the best judge. If there is danger that a secondary edema may develop, it is much better to have this anticipated by a tracheotomy. The end-results in the cases that we have reported have been good, and I am surprised to hear so many deaths reported. This is a good plan, and all such cases should be put on record, as they emphasize the importance of the procedure. I am also surprised that no one has mentioned the use of iodized oil 40 per cent. I think this would show a defect when a foreign body is suspected.

DR. GOOD: Three of my patients have died from bronchoscopy in twenty years, the last two occurring within a period of three months. The first fatality was due to pneumonia following the inspiration of the wooden part of a small blow whistle. When I was called, signs of pneumonia were present, and the child died in six days. The foreign body was in the lung six days before I was called, and a surgeon had performed tracheotomy. The other two patients did not have pneumonia. One was an infant, aged 8 months, who was given a piece of chicken bone to chew. The child suddenly collapsed, and was in bad condition when I saw it three hours later. I removed a piece of chicken bone, which was large enough to obstruct breathing on both sides of the lung. The child breathed well afterward, but died suddenly during the night. There was no asphyxia, and I did not know what caused death. I made it a coroner's case, but the coroner said a bone in the lung was enough to cause the death of any one, and signed the death certificate. The other case was that of a Jewish woman who had swallowed a fish bone. The roentgenogram showed nothing, but I found a fish bone 2 inches long and at the end of the bone a piece of raw fish meat, which I removed. I missed this on putting the bronchoscope down, and probably pushed it into the lung, for the woman died of a hydropneumothorax two days later. I think the esophagus is the most difficult place in which to work, and that it is easy to miss foreign bodies in the esophagus in passing a bronchoscope.

DR. BECK: The death of the infant may have been due to a large thymus in addition to the foreign body.

DR. WALTER H. THEOBALD: I agree with Dr. Boot that peanuts are troublesome foreign bodies. In one case of mine, in a child, aged 3 or 4 years, a peanut lodged at the bifurcation of the trachea, and, although it was removed within a few minutes after I saw the child, death occurred some fifteen or twenty minutes later. The pulmotor was used, and epinephrine was injected into the heart in an effort to save the child's life. Necropsy revealed a persistent thymus, and the cause of death was given as status lymphaticus.

DR. HARRY L. POLLOCK: The most important and troublesome cases of this type are those of nonopaque foreign bodies, in which a foreign body is suspected, but nothing is found on roentgenographic examination. In one such case a diagnosis of complete consolidation of the lung was made. The patient was brought to me, and I called Dr. McGinnis. No air was going through, but as soon as we passed the bronchoscope and put on some suction, a peanut was removed, and the child recovered. I believe that the use of iodized oil in the trachea and bronchus would have shown at once that obstruction existed.

I agree that small foreign bodies will pass out of the stomach, but I know of one case in which twenty-eight foreign bodies were discovered in the stomach, most of them knives and knife blades, which had remained in the stomach because they were too large to pass through the pylorus.

I believe that if a roentgenogram does not show anything, the bronchoscope should always be used. I do not believe a tracheotomy adds to the danger of this procedure. I should prefer to have one performed if an upper bronchoscopy failed.

DR. MCGINNIS: When I encountered the first case in which I could not insert the bronchoscope, I was greatly chagrined, but I have since found several instances in which it has been impossible to get the bronchoscope through the larynx, and in those cases I have performed a low tracheotomy.

I recently saw a Bohemian who had inhaled a nail. Several days later, when I attempted to pass the bronchoscopic tube through the larynx, I could not accomplish it because the man had a stiff neck. Even under ether anesthesia, the procedure was impossible. I performed a low tracheotomy and two days later removed the nail without difficulty. In the early days ether anesthesia was always used in these cases, but it was given up because of the excessive secretion. If the suction apparatus is used the secretion can be removed, and many physicians still prefer to do such work under a general anesthetic. Dr. Smythe, of Boston, recently reported in a paper much the same conditions that Dr. McGinnis has encountered in his work. The removal of many of the metal objects can be facilitated by means of the fluoroscopic screen. I have not used iodized oil because its use means an added procedure, and if one can locate the foreign body by means of the bronchoscope, it is not necessary to use iodized oil.

DR. BOOT: I agree with Dr. Salinger regarding extension, for, as I have stated in my paper, "what can get into the stomach usually can get out." I have had many cases of nonopaque foreign bodies, such as those reported by the other speakers.

In one case Dr. Abt advised against bronchoscopy because the roentgenogram showed nothing, but bronchoscopy was the only means of removing the foreign body and saving the child from abscess of the lung. I have tried many times to locate foreign bodies by examining the chest of the patient who has inhaled something, but I have never been able to determine by physical examination which side of the chest it is in. If the foreign body occludes the bronchus, determination is easy, but if not, it is difficult. There is danger of patients inhaling cotton placed on an applicator and used in the nasopharynx. This has occurred in a few cases.

In my opinion the passage of the bronchoscope is uncomfortable. I do not often perform tracheotomy in my work, but I think it is a good method for the beginner. I agree with Dr. Pollock that it does not add to the danger of the operation.

Referring to the use of an anesthetic, scopolamine and morphine constitute an anesthetic. Patients who have croup may need roentgenotherapy to reduce the size of the thymus, for it has been shown that the thymus continues to grow until the age of puberty or longer.

I believe the use of small safety pins should be prohibited. Regarding iodized oil, I think it is well to "Be not the first by whom the new is tried * * *."

In one case, in which a patient swallowed a nail, no examination was made of the chest by the roentgen ray, and the man was treated for syphilis of the lung because of a positive Wassermann reaction. I believe most of the mistakes in treatment are due to incomplete examination. The ordinary fluoroscopic table is poorly adapted to bronchoscopic work.

DR. POLLOCK gave an interesting address on his recent experiences in European clinics.

Directory of Ophthalmological and Otolaryngological Societies

NATIONAL

AMERICAN BRONCHOSCOPIC SOCIETY

President: Dr. D. Crosby Greene, 23 Bay State Road, Boston.
Secretary-Treasurer: Dr. Henry B. Orton, 24 Commerce St., Newark, N. J.
Place: Hotel Chelsea, Atlantic City, N. J. Time: May 21, 1927.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Chevalier Jackson, Philadelphia.
Secretary: Dr. George M. Coates, 1721 Pine St., Philadelphia.
Place: Atlantic City, N. J. Time: May 23-25, 1927.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Burt R. Shurly, 62 W. Adams Ave., Detroit.
Secretary: Dr. R. L. Loughran, 33 E. 63d St., New York.
Place: Atlantic City, N. J. Time: May 26-28, 1927.

AMERICAN OTOLOGICAL SOCIETY

President: Dr. Max A. Goldstein, 3858 Westminster Pl., St. Louis.
Secretary: Dr. D. Harold Walker, 390 Commonwealth Ave., Boston.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

President: Dr. Ross Hall Skillern, 1928 Chestnut St., Philadelphia.
Secretary: Dr. William P. Wherry, Medical Arts Bldg., Omaha.
Place: Book-Cadillac Hotel, Detroit. Time: September 12-16, 1927.

LOCAL

ATLANTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

President: Dr. Calhoun McDougall, Medical Arts Bldg., Atlanta, Ga.
Secretary: Dr. Zach W. Jackson, Doctors Bldg., Atlanta, Ga.
Place: Academy of Medicine, 32 Howard St. Time: 8 p. m., last Thursday of each month.

SECTION ON OTOLOGY AND LARYNGOLOGY OF THE BALTIMORE CITY MEDICAL SOCIETY

Chairman: Dr. Edward A. Looper, 605 Park Ave., Baltimore.
Secretary: Dr. Edwin N. Broyles, 1100 N. Charles St., Baltimore.
Place: 1211 Cathedral St. Time: 8:30 p. m., last Friday of each month.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Arthur M. Corwin, 25 E. Washington St., Chicago.

Secretary: Dr. Austin A. Hayden, 25 E. Washington St., Chicago.

Place: Grill Room, Stevens Restaurant, 16 N. Wabash Ave. Time: 6 p. m., first Monday of each month from October to May.

CINCINNATI OTO-LARYNGOLOGICAL SOCIETY

President: Dr. Frederick W. Lamb, Provident Bank Bldg., Cincinnati.

President-Elect: Dr. Walter Murphy, 707 Race St., Cincinnati.

Secretary-Treasurer: Dr. Harris H. Vail, 24 E. 8th St., Cincinnati.

Place: University Club. Time: 6:45 p. m., second Tuesday of each month from October to May.

THE OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SECTION OF THE CLEVELAND ACADEMY OF MEDICINE

Chairman: Dr. W. J. Abbott, 8314 Euclid Ave., Cleveland.

Secretary: Dr. A. L. Stotter, 1148 Euclid Ave., Cleveland.

Place: Winton Hotel. Time: Fourth Friday of each month.

THE COLORADO OTO-LARYNGOLOGICAL SOCIETY

President: Dr. David A. Strickler, Empire Bldg., Denver.

Secretary: Dr. C. Howard Darrow, Metropolitan Bldg., Denver.

Place: Assembly Room of Metropolitan Bldg. Time: First Saturday of each month from October to May.

EASTERN NEW YORK EYE, EAR, NOSE AND THROAT ASSOCIATION

President: Dr. J. Ivimey Dowling, 116 Washington Ave., Albany, N. Y.

Secretary-Treasurer: Dr. L. Prescott Brown, 33 Bancker St., Albany, N. Y.

THE KANSAS CITY EYE, EAR AND NOSE SOCIETY

President: Dr. Joseph W. Kimberlin, Rialto Bldg., Kansas City, Mo.

Secretary: Dr. A. E. Eubank, 636 Argyle Bldg., Kansas City, Mo.

Time: Third Thursday of each month from September to May; the November, January and March meetings are devoted to clinical work.

NEW ORLEANS OPHTHALMOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. Val H. Fuchs, Chaille Medical Bldg., New Orleans.

Secretary-Treasurer: Dr. Carl E. Granberry, Maison Blanche Bldg., New Orleans.

Place: Senses Hospital, Touro Infirmary, and Charity Hospital (in rotation).

Time: 8 p. m., third Thursday of each month from September to June.

THE SECTION ON LARYNGOLOGY AND RHINOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. John E. Welch, 138 W. 70th St., New York.

Secretary: Dr. Arthur Nilsen, 40 E. 41st St., New York.

Time: 8:30 p. m., fourth Wednesday of each month from October to May.

THE OTOLOGICAL SECTION OF NEW YORK ACADEMY OF MEDICINE

Chairman: Dr. J. L. Maybaum, 12 E. 86th St., New York.

Secretary: Dr. R. T. Atkins, 4 W. 53d St., New York.

Place: 103d St. and Fifth Ave. Time: Second Friday of each month from October to May.

THE MILWAUKEE OTO-OPHTHALMIC SOCIETY

President: Dr. Charles J. Coffey, 221 Grand Ave., Milwaukee.

Secretary-Treasurer: Dr. Edward R. Ryan, 425 E. Water St., Milwaukee.

Place: University Club. Time: 6:30 p. m., third Tuesday of each month.

THE MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY

Chairman: Each member, in alphabetical order.

Secretary: Dr. M. B. Selingstein, 801 Union and Planters Bank Bldg., Memphis, Tenn.

Place: Eye Clinic of Memphis Eye, Ear, Nose and Throat Hospital. Time: 8 p. m., second Tuesday of each month.

THE SECTION ON OTOLOGY AND LARYNGOLOGY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

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